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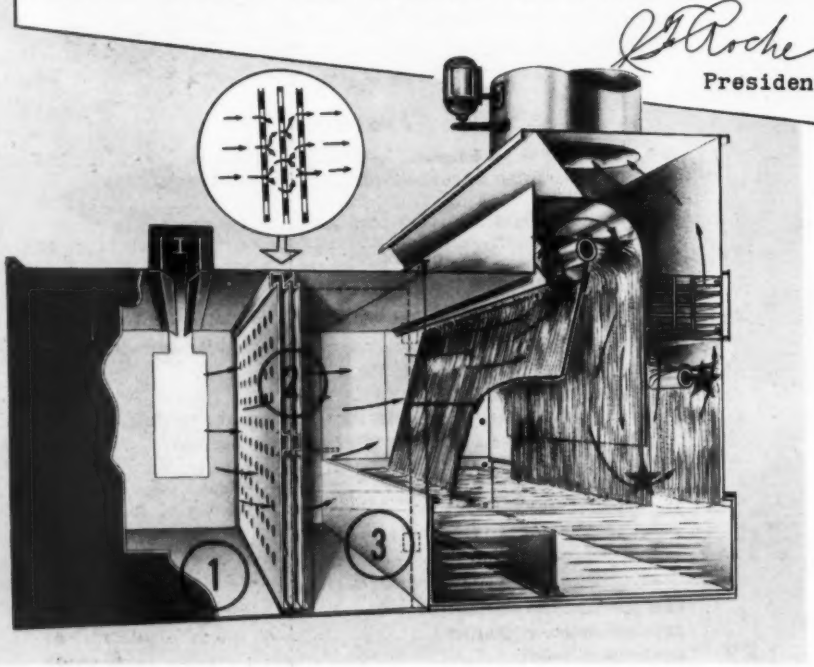

R. J. Roche
President

All frit is removed from over-spray. Binks Dynaprecipitor units for ceramic finishing have a perfect air-cleaning action. Part of the over-spray settles on the floor of the booth (1). Most of the remaining frit is trapped by the staggered baffle plates through which the air is drawn (2). Still more frit collects in the antechamber to the water chamber (3) and the little which is left is quickly washed out in one of the five washings (see stars ★) the air receives before it is vented. All frit in the oven-spray is reclaimable.

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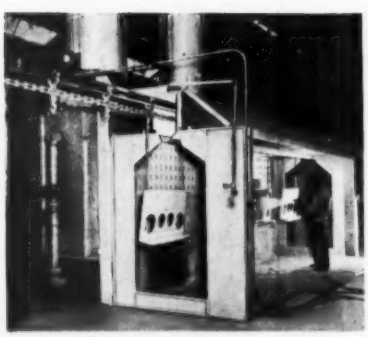

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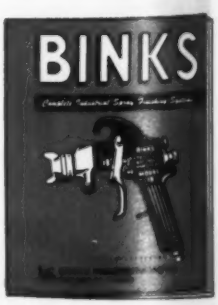

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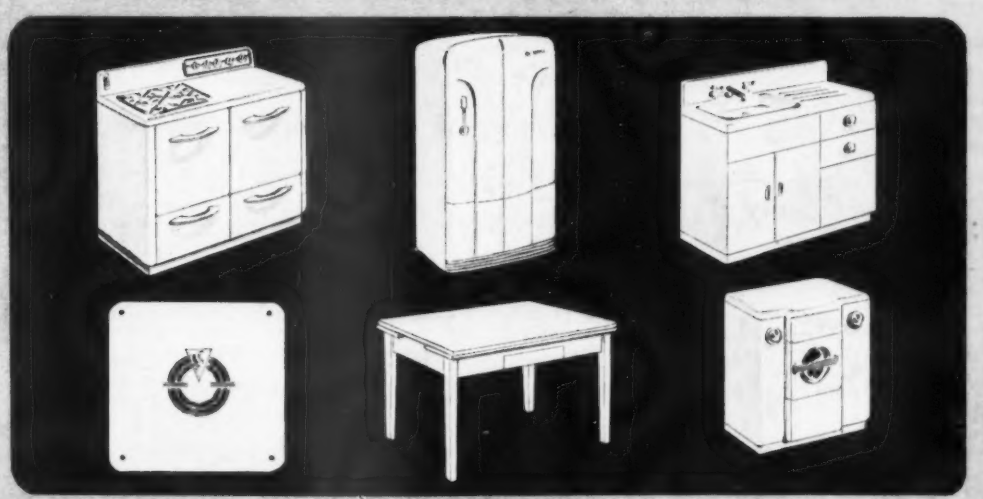

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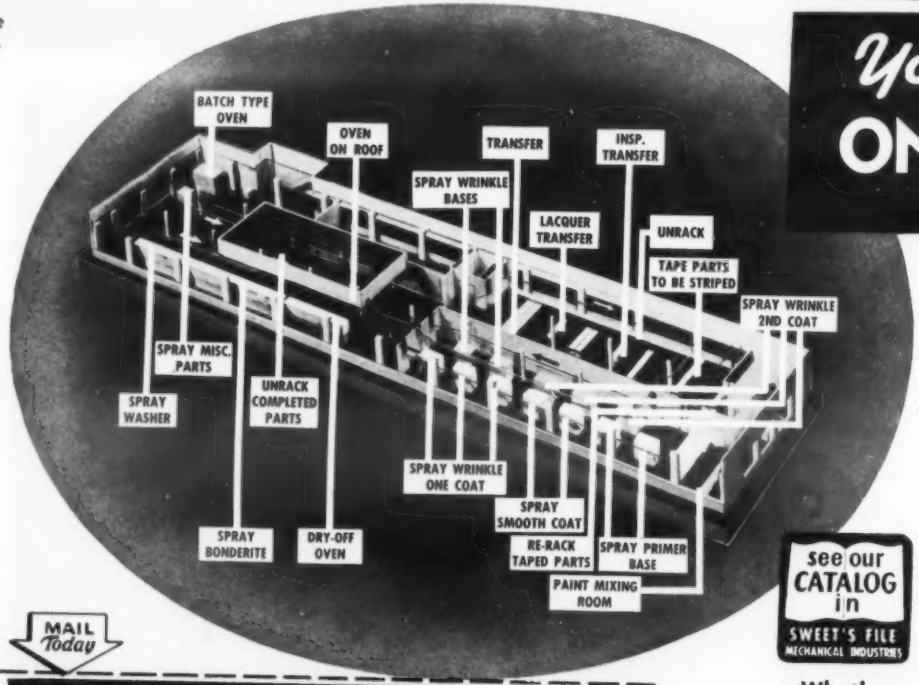

see our CATALOG in SWEET'S FILE MECHANICAL INDUSTRIES

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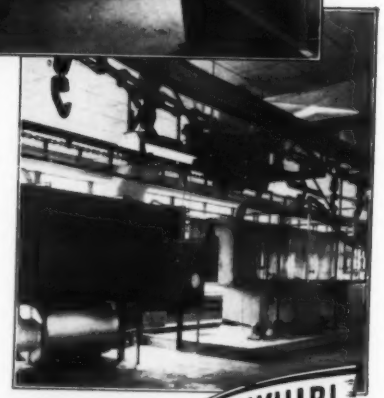

Shown at left is a mock-up of a job recently installed in a large typewriter plant

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This Emblem . . . . . designed by P.E.I. identifies products finished in genuine Porcelain Enamel. It sets these products apart as having the highest quality finish and guides the purchaser in making his selection. It is offered to manufacturers using genuine Porcelain Enamel as an important part of their product finish.

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1. MARKET DEVELOPMENT COMMITTEE — provides the Institute, its sub-divisions and individual members, counsel, guidance and assistance in connection with the successful marketing of Porcelain Enameled Products and supervises advertising and publicity activity.

2. COMMERCIAL RESEARCH COMMITTEE — locates, investigates, studies and reports on both existing and potential markets, advising the membership on market trends and opportunities.

3. PRODUCT STANDARDIZATION COMMITTEE — develops methods of testing and evaluating properties of Porcelain Enamel and develops practical apparatus for test work. (*A research fellowship at the National Bureau of Standards effectively backs the work of this committee on testing and evaluation methods.*) Performance specifications are also a part of this committee's activity.

4. PROCESS DEVELOPMENT COMMITTEE — does research and reports on the practicability of new technical developments, and new equipment and processes for improved efficiency in enamel plant operation.

5. FORUM COMMITTEE — evaluates technical progress in Porcelain Enameling and develops programs for the annual PEI Forum for plant men — a most valuable industry asset.

6. THE INSTITUTE DEVELOPMENT COMMITTEE — works to broaden the base of Institute activity, to strengthen its structure and to expand its opportunities for rendering greater service to the membership.

7. SALES AND MANAGEMENT CONFERENCE COMMITTEE — has the responsibility of developing a program for an annual conference to present selling methods and demonstration techniques to assist management and sales management in the promotion and sale of porcelain enameled products.

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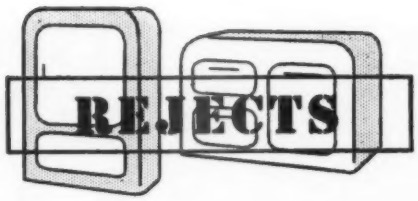
STOP 

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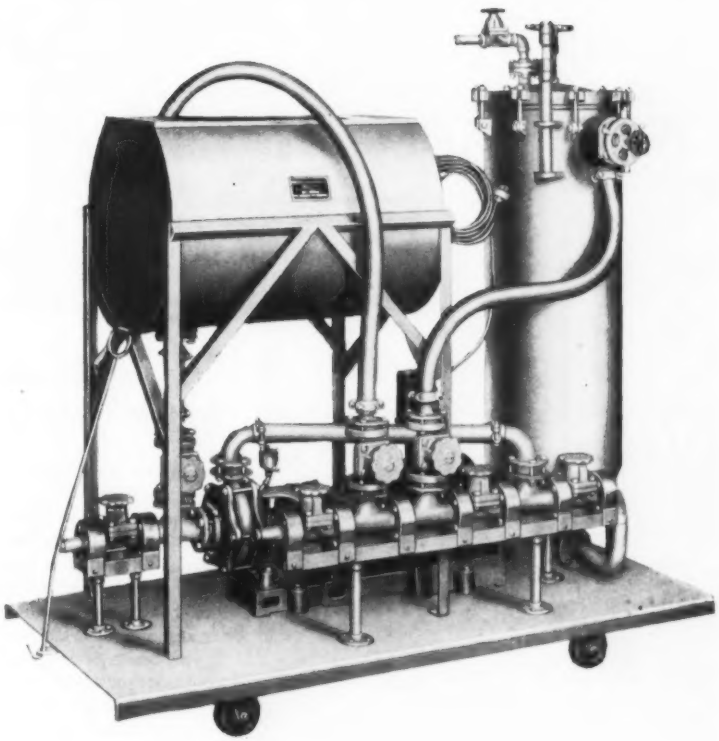

Illustrated above is a filter used by average sized enameling plants.

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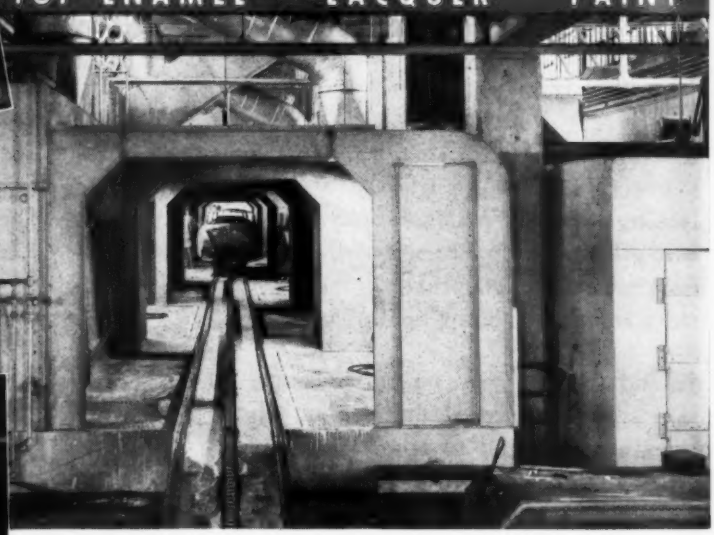
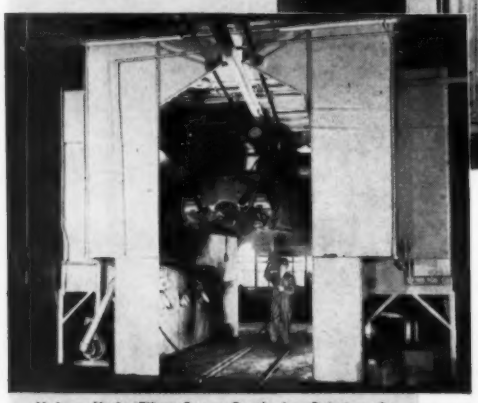
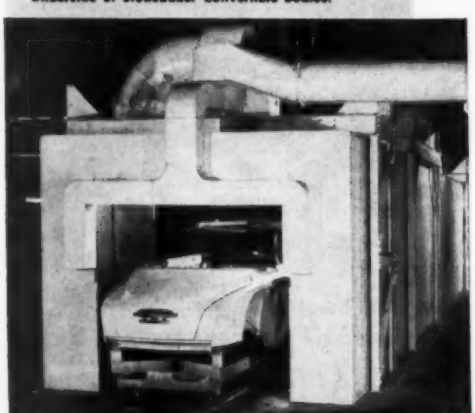
Above: Typical Mahon Filtered Supply Unit which Supplies Clean, Tempered Air to Spray Rooms of Mahon Finishing Systems at Studebaker. At Right: Mahon Hydro-Filter Spray Booths installed in Production Line for Applying the Fine Finish to Studebaker Convertible Bodies.





Mahon Hydro-Filter Spray Booth for Painting the Underside of Studebaker Convertible Bodies.



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MAHON

THE Finish Line

NEW FIELDS TO CONQUER — In the July, 1944, Finish Line we pointed to appliances as representing the greatest use for porcelain enameled metal — but, we said, "Giving proper attention to established markets need not prevent the industry from encouraging logical new uses. A few are being uncovered at present — many more can come later as a result of intensive product and market research activity.

"Of the new fields entered prior to the war, architectural porcelain enamel unquestionably shows the greatest promise."

Advice from an architect

In August, 1947, *finish*, Don Graf, experienced architect and design consultant, in an article entitled "Easy Marketing," voiced the opinion that there are more than enough uses for porcelain enamel to absorb all the industry can produce. He was strong in his recommendation that porcelain enamel be allowed to stand on its own feet as a material. He had this to say:

"A glance back through the five thousand years of recorded architectural history will reveal no example of a building product getting anywhere if used in imitation of another.

"Ever hear of scagliola? It looks like marble — but it isn't. It's made of plaster and is cheaper, but it lacks the conviction of being marble. As a result, the scagliola business does not present any exciting profit possibilities in the building material field, and never did!"

Many additional "imitation" materials were referred to in "Easy Marketing." Said Graf, "Imitation may be the sincerest flattery in some phases of life, but it is the quickest road to oblivion for building materials!"

(Another exclusive feature article by Don Graf will appear in a forthcoming issue of finish)

An enameler agrees

We were interested in reading the expressed opinion of Robert L. Krupp, president of Lansdale Porcelain Enamel Corporation, on the subject of the "frank" use of porcelain enamel. He said:

"Perhaps because porcelain enamel is so versatile, because the metal can be shaped so easily, because its surfaces can be made smooth, rough, dull or mirror bright, many designers and builders have used it as a substitute for tile, stone, stucco, and other materials, forming it, coloring it, and installing it in traditional ways.

"To be sure the particular virtues of porcelain enamel work—resistance to moisture, erosion, stain, and so on—amply rewarded such substitutions. But no building material ever made an important place for itself as a substitute for something else.

"Now, however, porcelain enamel work is being used as it should be used — *frankly* as porcelain enamel work. Exterior and interior surfaces are made from large sheets, joined at the edges and corners in a way that makes no pretense of carrying weight, as stone is laid to stagger vertical joints.

"Porcelain enamel has the five basic requisites — function, appearance, installability, cost, and service — commend it as a useful and effective surfacing material. It is creating a place for itself comparable with those of stone, ceramics, metal, wood, and all the rest."

A point for the steel industry

It is expected that more and more steel will be used in architecture as it becomes available. Developments are under way for the more extensive use of steel for facing multi-story buildings.

There is this to remember — without a *definitely permanent finish*, ordinary steel would be useless for this purpose. Porcelain enamel presents the one permanent finish available for this purpose. Therefore, steel and porcelain enamel are logical partners in any advancement in the use of metal exteriors for our skyscrapers of the future. Stainless, of course, has its part in the picture — and, fortunately, stainless and porcelain enamel may be architecturally blended to enhance the effectiveness of both materials.

That brings up a suggestion made in an earlier editorial — that we open our eyes and minds to the use of a *combination of materials* when and where such a combination will prove a result advantageous to the ultimate purchaser. If, as is entirely possible, the total use of architectural porcelain enamel can be greatly expanded by encouraging the liberal use of other materials in combination, then let's do what we can to encourage a trend in this direction.

Dana Chase

EDITOR AND PUBLISHER

Your Requirements Determine the Temper of These Sheets

The enameling iron sheets you work are sure to fit your needs . . . if they're labeled "Inland." Here's why. Capable Inland metallurgists study your individual fabricating problems — then develop sheets *tempered* specifically for the drawing and forming requirements of your product. Before shipment, every lift of Inland enameling iron sheets is double-tested to check the degree of hardness and ductility your order calls for.

What's more, production of uniform quality steel is important at Inland. You can be sure that the Inland sheets you receive one year from now will be identical to the sheets you received yesterday. We are striving to increase production of these quality sheets in order to meet the unusual demand for them. INLAND STEEL CO., 38 S. Dearborn St., Chicago 3, Ill.

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Porcelain enameling in Italy

including description of interesting equipment and methods

By Dr. Paul A. Huppert • LISK-SAVORY CORPORATION, CANANDAIGUA, N. Y.

finish

Italy has an old established enameling industry. The leading factories have been Moneta and Smalterie Italiane, both located in Milan, Northern Italy's industrial center, and Gaensler-Bederida, in Turino. In spite of these plants, before and a few years after the First World War, the import of enameled utensils from Austro-Hungary, Germany, and later on from Czechoslovakia, was quite important until 1924 when the Yugoslav "A. Westen" Enameling concern established a new enameling plant in Bassano, also in Northern Italy, under the name of "S. A. Smalteria & Metallurgica Veneta."

Bassano is a little provincial town located on the foot of the Monte del Grappa, which became famous during the First World War in the fighting between the Italian and German troops, marking one of the turning points in favor of the Allies' victory. It lies some thirty miles north of Venice and Padova, both old Italian cultural and economic centers.

As the Westens were closely related to the Haardts, the famous leaders in the history of the enameling industry, they could put all their great family experience and financial means into the foundation of this new factory and thus create one of the most up-to-date European enamel plants.

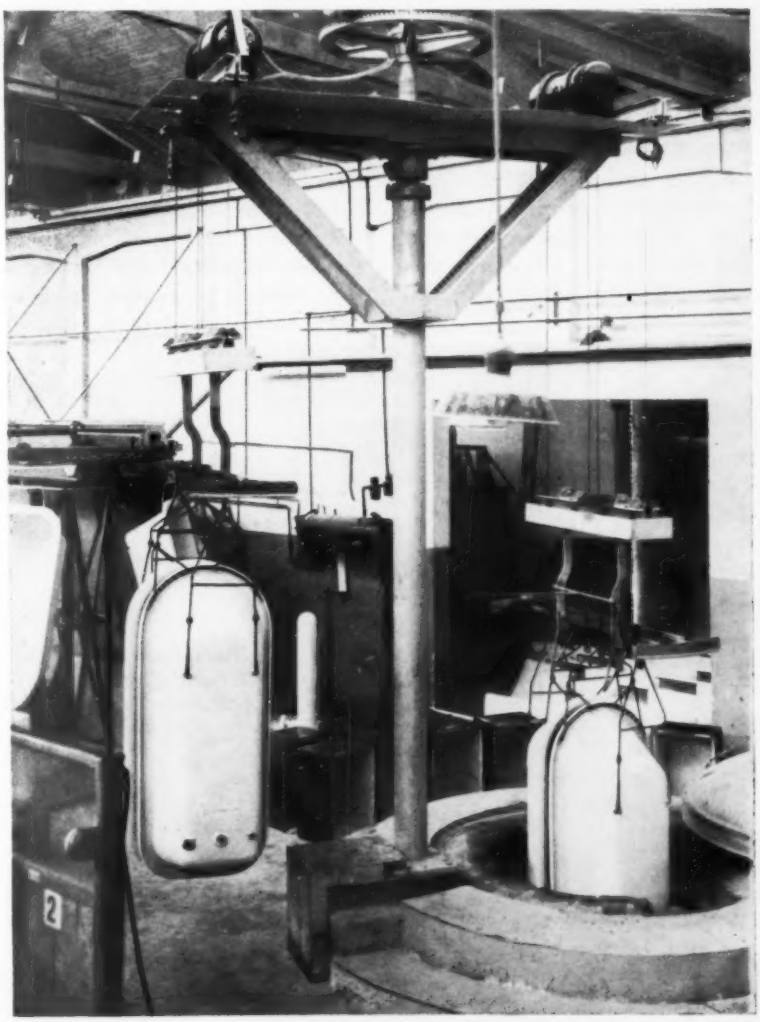
The plant in Bassano comprises one main rectangular, one-story, concrete building of 350,000 sq. ft. The building is divided into three more or less equal sections: the stamping department; the enameling department, including production of frits; and the warehouse, enclosed by railroad sidings on all four sides for unloading incoming raw materials and for shipping finished goods.

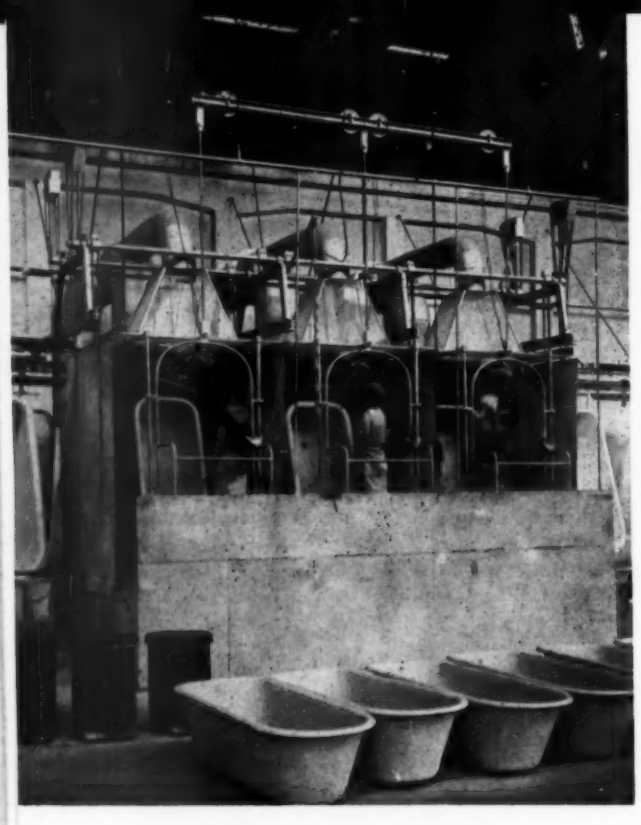
Around these main premises are arranged a few smaller buildings for offices, recreation rooms, gas producer, and carpenter shop — and for other purposes.

The enameling department was originally constructed for a daily output of ten tons of enameled kitchen utensils and hospital ware, serving the Italian market and exporting to the Italian colonies.

The holloware assortment consists of the usual Italian items, which

This specially constructed cylindrical furnace for firing bath tubs has a removable cover on a level with the working floor.





In the spray booths, tubs can be turned around on hooks from which they are suspended.

mainly comprise bellied sauce pots, kettles, wash basins, chamber pots and the like.

With time, a large variety of other production lines were added — such as refrigerators; steel helmets for the army; stainless steel items; hot tinned dairy equipment; galvanized telegraph poles; porcelain enameled stoves fired by oil, gas, electricity or coal; electric hot plates; enameled signs; welded radiators for domestic heating; enameled steel bath tubs; glass lined tanks for the chemical industry; aluminum goods, and others.

This split variety of articles is somehow significant for the European industry in general; it shows especially the fact that in Europe the same enameling department produces holloware and flatware with practically the same equipment. The main reason for doing so, of course, is the fact that in prewar Europe the market for enameled flatware was too small to justify specialization. At least this was the apparent feeling of the management; thus, every larger enameling plant tried to produce practically everything.

The company employs about 1500 workers and a staff of 50 employees for administrating and supervising when in full production, using its entire facilities.

Continuous dryers are arranged for putting in complete "boards" loaded with ware.

The stamping department

The stamping department is equipped with new up-to-date machinery, mostly double action toggle presses working with pneumatic cushions. A hydraulic press is used for special deep drawings, like kitchen sinks, bath tub parts, and the long radiators. A so-called "Hilo" press (produced by the German constructors Hiltmann and Lorenz, whose plant has been reported destroyed during the war), which is a multiple press with six steps and transfer feeders, is working the year round on the most frequent size (9″ diameter) of bellied chamber pots, turning out about 8,000 pieces per day using gauge .32 mm (equals No. 29 to 30 gauge). The dies are not changed, but from time to time the press is stopped for redressing them; this press, too, is equipped with pneumatic cushions.

A continuous oil fired annealing furnace is located in the center of the press room to be close to all presses. With the Italian quality of steel, a lot of annealing is necessary between drawings. No acid or acid fumes are used in the annealing operation. A flat belt conveyor passes first the hot zone and then the cooling chamber, which consists of a round tunnel with an insulating double wall mantle. The warm air in this double mantle serves as secondary air for the oil burners. Furnace and chain are constructed of ordinary material as the low annealing temperature does not require the use of any heat resisting alloy.

A number of black shapes are pro-

duced by a tinsmith department, including also seamed or electric welded shapes.

The pickling department

All ware is still being scaled; no chemical cleaning has been introduced as yet.

The pickling department is only partly mechanized as they are using electric hoists, yet employing two men per tank. Only the electric dryer is fully mechanized. It is equipped with a flat belt conveyor passing a tunnel large enough to take care of bath tubs and other big items. Like in most European plants, muriatic acid (about 11% H Cl) is used for pickling. The tanks are built of concrete and lined with acid resisting bricks.

The bulk of the ware is transferred directly from the press room to the pickling department; very few black shapes are stored. Large articles are being cleaned by sand blasting, especially since the company believes in thus avoiding fish scales on heavier gauges.

The enameling department

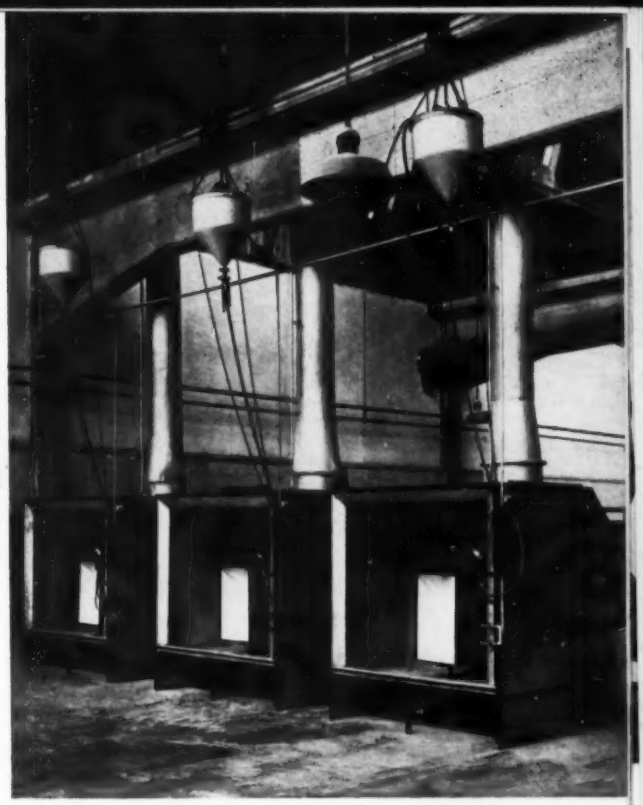
The enameling department comprises four divisions: the holloware section, the flat ware section, the bath tub department, and the decorating shop.

Since the company operates its own electric power plant, making use of the River Brenta on which Bassano is located, the entire enameling department has become electrified in late years.

They have at their disposal two electric continuous U-type furnaces of 400 KW each; two electric box type furnaces of 180 KW each; one smaller one of 70 KW; and a special "pit" furnace, for the burning of bathtubs, of 200 KW. This latter unit is constructed along the company's own ideas representing one of the most interesting features.

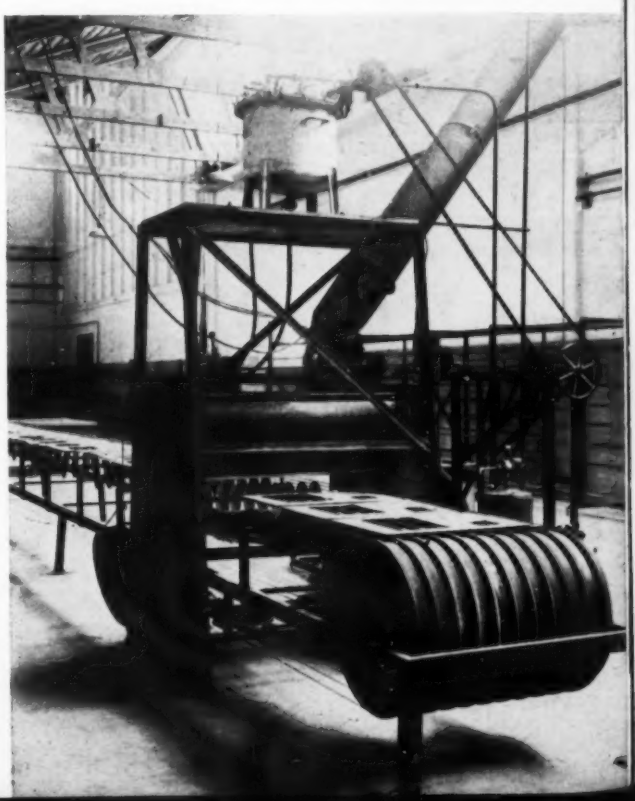
Even the dryers are heated by electricity, although it has been found that almost an equal amount of electric energy is consumed for this purpose as for firing.

When the plant was founded, the source of fuel had been producer gas. Since, however, Italy has had to import its coal and the price has become prohibitive, so they have switched over to oil, leaving the furnace construction otherwise unchanged. After the first experiments with electric furnaces were successful, they then built their own power plant and electrified almost the entire factory.

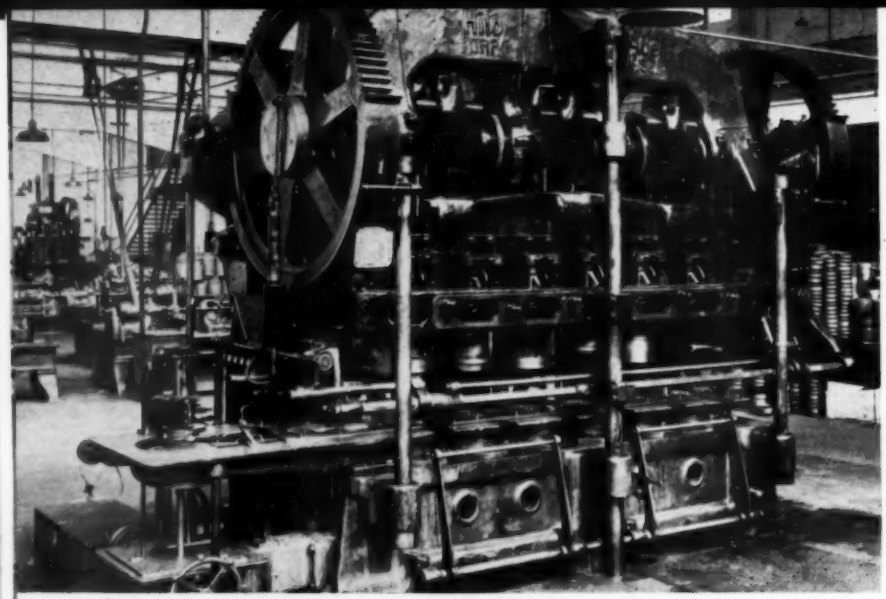


This photograph shows installation of battery of spray booths for refrigerator liners.

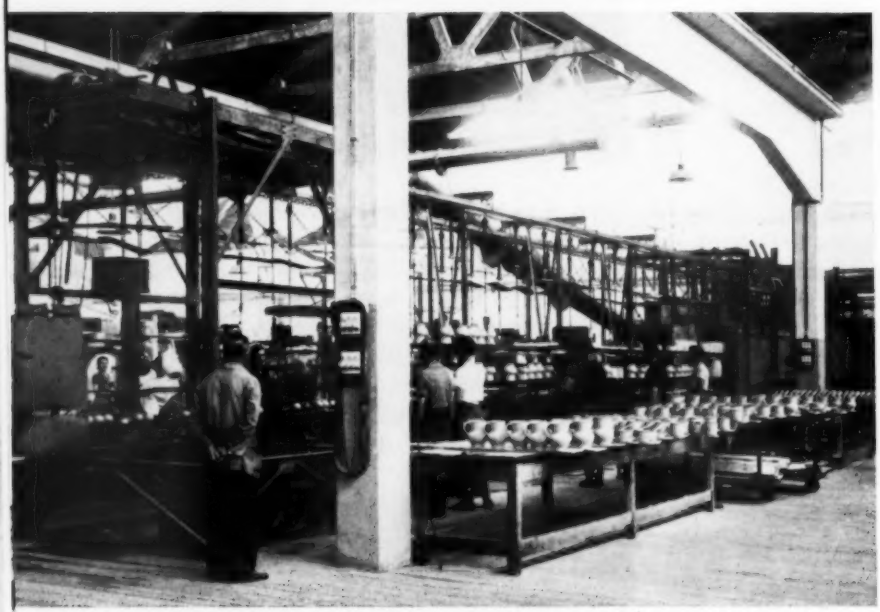
The company was one of the first enameled ware manufacturers in Europe using a continuous furnace. Their original unit, a conventional straight through furnace, was installed in 1927. Within one year they became the pioneers by constructing the first European U-type furnace when, based on their general experience of the



An automatic spraying system is used in the production of flat ware including signs.



Progressive six-stage press with transfer feeders.



Loading the continuous electric U-type furnace.

Dipping ware and loading on dryer conveyor.

continuous firing process, they converted one of their double box-type furnaces into a hairpin-shaped continuous furnace. This model soon was adopted by all the European furnace constructors and introduced then as the standard European U-type furnace.

The firing chamber is about 14′ long; the pre-heating and cooling zone is about 20′ long. While the hot zone of these furnaces is about the length of the American "Junior" type, Europe is using a very short pre-heating zone, which is certainly a disadvantage. The width of the interior is 32″, with a partition wall in the firing chamber. The hourly output varies from 1,000 to 1,400 lbs. once-fired holloware. About 70′ of chain travels outside the furnace, giving enough room for 5 to 6 ground coat dippers to work directly on the chain. On the point where the chain leaves the firing zone and enters the cooling chamber, a door enables the taking out of warped pieces for straightening. Two men work there—one unloading and the other one stamping the pieces, changing positions every half-hour.

The interior dimensions of the larger box type furnaces are 9′ x 4′; the smaller unit, of 3′ x 3′—used for small stove parts, signs, and cast iron fixtures.

Complicated items are dipped in ground coat during the day time and are pre-dried and stored for the night, while the ground coat dipping direct on the chain is done during the night turn.

As material for the burning tools, Krupp AKC-stainless steel is used. The larger parts are constructed from rods of ¼″ to 5/16″ diameter. Between the bottom rack of the burning basket and the furnace floor is ample room to suspend items that can be hung. Every 20′, large steel plates are hung between the baskets on the furnace chain for increasing fuel economy.

When firing finish ware, three persons load, two unload, two straighten the ware, while one man takes care of transporting.

The dipping tanks are well con-

to Page 70 →

Enamel division program

for A.C.S. golden anniversary meeting

including abstracts by the authors

finishfotos

THE Golden Anniversary Meeting of the American Ceramic Society, to be held at the Palmer House in Chicago, April 25-30, will feature the presentation of more than 130 papers on methods, processes and materials in the ceramic field by leading technologists.

While the 50th convention opens on April 25, sessions of the Enamel Division are scheduled to start Tuesday, April 27, and continue through Thursday, April 29. Twenty-two papers will be presented on the division's program. Plant visitations are scheduled for Friday.

A special symposium on titanium enamels will be held Wednesday afternoon, April 28, with W. H. Pfeiffer, Frigidaire Division of General Motors Corp., presiding chairman. Following the presentation of two papers, the symposium will become an open forum discussion of problems pertinent to the formulation, application, and firing of titanium enamels. Opportunity will be afforded members to submit written questions in advance.

The program of the Enamel Division, as released by ACS, follows:

Tuesday Forenoon, April 27

1. *Modern Instrumentation for Measuring Temperature Gradients in Continuous Porcelain Enameling Furnaces*

By M. Bozsin and C. A. Vana: Ferro Enamel Corporation, Cleveland, Ohio

Records of temperature gradients in enameling furnaces furnish important data bearing on the quality of the enamelware. A portable insulated box containing a three-point electronic temperature recorder has been developed to travel the enamelware path in furnaces heated to a maximum of 1600°F. This records the temperature gradient simultaneously at three levels in the furnace under normal firing conditions. Typical charts from good and poorly fired furnaces are submitted. Factors contributing to good furnace operation are discussed.

2. *Use of Plastic Replicas to Evaluate Surface Texture of Enamels*

By J. C. Richmond: National Bureau of Standards, Washington, D.C.

A technique is described for making plastic replicas of enamel surfaces. Replicas were examined microscopically, by both transmitted and reflected light. Their transmission, haze, and gloss were measured and they were projected. A number of replicas illustrating various types of enamel and other surfaces are shown.

Details of surface texture that are difficult or impossible to see in the original surface are readily seen in the replica.

D. G. Moore, program committee chairman

3. *Residual Stresses in Enameled Sheet-Iron Specimens*

By R. A. Jones and A. I. Andrews: Department of Ceramic Engineering, University of Illinois, Urbana, Ill.

A method of quantitatively measuring the magnitude of the stresses existing in porcelain enamel specimens is described. The method involves measuring with a mechanical strain gauge the dimensional changes which occur when an enameled-metal specimen is de-enameled. The theoretical approach to the problem is reviewed and equations are derived. The results obtained in tests on a series of ground-coated specimens are presented and indicate that, with a normal application of a commercial three-frit ground coat on 20-gauge enameling iron, a compressive stress of about 35,000 lb. per sq. in is present in the enamel.

4. *Effect of Humidity on Physical Properties of Porcelain Enameled Surfaces*

By Alexis Hannan: Pemco Corporation, Baltimore, Md.

It is well known that atmospheric moisture content affects the physical properties of glasses, including porcelain enamels. While some porcelain enamel tests have been designed to prevent variations due to this factor, others have not. The present work is concerned with the evaluating of porcelain enamels for resistance to impact, torsion, cross bending (tension), and abrasion in atmospheres with various degrees of humidity ranging from less than 10 to greater than 90%.

Tuesday Afternoon, April 27

5. *Preliminary Study of Ceramic Coatings for High-Temperature Protection of Molybdenum*

By D. G. Moore, L. H. Bolz, and W. N. Harrison: National Bureau of Standards, Washington, D.C.

Several coatings for molybdenum were developed which can be applied to the metal by firing at 2150°F. in oxygen-free atmospheres. Tests on coated pieces fired in this manner included (a) heating in a gas-oxygen flame, (b) heating at constant temperature in an air atmosphere, and (c) installation of coated parts in the blast of a ram-jet engine.

Results of these tests indicate that the coatings offer protection for long periods at 1650°F. and greatly retard the oxidation rate at higher temperatures.

One current use of the new coatings is for the protection of molybdenum Pitot tubes which are built into the nozzle end of ram-jet engines of the type used for pilotless aircraft. These tubes, which are subjected to a gas temperature of about 3000°F., are expendable and need not last more than 5 minutes. Test of a coated tube under simulated service conditions indicated a life in excess of 45 minutes.

6. *Use of New Lithium Compounds in Enamels*

By Walter M. Fenton: Metalloy Corporation, Minneapolis, Minn.

Results obtained by the use of lithium compounds in both ground coats and

titanium enamels are described. Lower firing temperatures and shorter firing cycles have been found possible when small amounts (up to 1½%) of lithium manganite are smelted with the ordinary-type ground coats, or, in some cases, as mill additions.

Lithium silicate as a 1½%-smelted addition in titanium enamels has been found to increase reflectance and decrease the softening temperature without detracting from acid resistance. Similar action is also obtained with lithium-free titanium enamels when lithium titanate and lithium zirconate are added in small quantities as mill additions.

The results as presented are based on both laboratory tests and plant experience.

7. *Mirawal Continuous Process for Production of Thin Enameled Sheet*

By R. B. Evans: Baltimore Porcelain Steel Corporation, Baltimore, Md.

The recently developed Mirawal process for producing continuous rolls of highly flexible enameled sheet steel for both interior and exterior use is described.

In the Mirawal process specially prepared 32-gauge (0.010-in.) sheet, 16 in. wide, is unwound from a coil and passed successively through (1) a nickel bath, (2) an infra-red drier, (3) a ground-coat spray, (4) an electrically heated ground-coat furnace, (5) a cover-coat spray, and (6) an electrically heated cover-coat furnace. The finished enameled

J. J. Canfield, division chairman

sheet is wound in 100-ft. coils of about 16 in. outside diameter and packed in paper cartons for shipment.

The thickness of the sheet, including enamel and metal, is approximately 0.025 in. The enameled sheet is cut with an ordinary paper cutter.

8. *Comparison of Various Antimonates as Opacifiers in Dry-Process Enamels for Cast Iron*

By William W. Coffeen: Metal & Thermit Corporation, Carteret, N. J.

Various antimonates, including the alkali and alkali-earth antimonates, were compared as frit opacifiers in a commercial acid-resisting dry-process enamel for cast iron. Reflectance, color, and acid-resistance data on all enamels are presented to show the effect of pound-for-pound replacements. Sodium, magnesium, and barium antimonates compared favorably in opacifying power. Enamels utilizing barium antimonate exhibited improved acid resistance.

Wednesday Forenoon, April 28

9. *Relation of Ground-Coat Enamels to Surface Texture of Cover-Coat Enamels*

By Robert Foraker and Philip Lubertine: Pemco Corporation, Baltimore, Md.

The effect of application weight, firing treatments, and ground-coat fluidity upon the surface texture of antimony, zirconium, and titanium cover coats was determined. Several ground-coat combinations were used ranging from the conventional "hard types" to the so-called "soft" or high-speed ground coats.

10. *Some Observations on Reactions of Enamel and Iron*

By Grant Miller and B. J. Sweo: Ferro Enamel Corporation, Cleveland, Ohio

Observations of gas evolution were made during the course of heating mixtures of powdered iron and finely divided enamel frits. The specific gravity of the resulting mass was taken as an index of the degree of gas evolution. Gas-evolution data were obtained as a function of the time of heating, temperature employed, material addition, and type of frit in the mixture. Some observations with other metals are also included.

11. *Weather Resistance of Porcelain Enameled Iron Structural Units, Part II*

By W. N. Harrison and D. G. Moore: National Bureau of Standards, Washington, D. C.

A study of the weathering resistance of porcelain enameled architectural panels was begun by the National Bureau of Standards in 1939. The study involves 864 one-foot-square panels and a like number of 4- by 6-in. laboratory specimens. A previous report (*J. Research Nat. Bur. Standards*, 28 [6] 735–54 (1942); RP 1476) gave the results after one year of exposure. The present paper describes the condition of the panels after seven years of weathering at the four selected exposure sites, namely, Washington, D.C.; St. Louis, Mo.; Lakeland, Fla.; and Atlantic City, N. J.

Comparisons are made of the effect of both acid resistance and climatic conditions on the resistance to weathering. Color slides are shown to illustrate differences.

12. *Spot Test for Chemical Resistance of Enamel Surfaces*

By John T. Roberts: Research and Development Laboratories, Crane Company, Chicago, Ill.

A method for testing the acid stability of an enameled surface is described. Various types and concentrations of acids were applied to different types of enamels for various periods of time and temperature. The severity of the attack was related to the color of the stain produced.

Wednesday Afternoon, April 28

13. *Effects of Various Clays Used in Mill Additions on Properties of a Titania-Opacified Enamel*

By Edward E. Marbaker: O. Hommel Research Fellow, Mellon Institute, Pittsburgh, Pa.; and Hollis S. Saunders and Leon N. Baumer: O. Hommel Company, Pittsburgh, Pa.

In the course of investigations made in connection with the development of titania opacified enamels, it was observed that

F. A. Petersen, division secretary

color, reflectance, and acid resistance were influenced by the clay used in the mill additions. During a search for a clay which would produce the best over-all enamel properties, a study of the effects of twenty clays of different types was made under standardized conditions. The fineness, specific gravity, resistivity, and pick-up of the slips were determined. Coatings sprayed at 30 gm. per sq. ft. were examined for bisque strength, brushing behavior, and tearing. After firing at 1540° F. for 3 minutes, the reflectance, color, gloss, and acid resistance of the enamels were observed and a careful examination of the enamel surfaces was made with respect to defects such as orange peel, pinholing, and black-specking. It was concluded that the success or failure of an enamel is determined in an important degree by the clay used in the mill addition.

14. *Effect of Size and Shape of Titanium Oxide Crystals on Spectrophotometric Properties of Titanium-Bearing Porcelain Enamels*

By A. L. Friedberg, R. B. Fischer, and F. A. Petersen: Department of Ceramic Engineering, University of Illinois, Urbana, Ill.

Color changes of three titanium enamels given varied firing treatment were investigated. The size and shape of titanium oxide particles were studied with the electron microscope. The relative amounts of anatase and rutile were measured from X-ray analyses. Spectrophotometric curves of the fired panel were made.

Electron micrographs showed rutile particles to re-crystallize as needles or "sticks," whereas anatase appeared as ill-defined, irregularly shaped, rounded particles. With increasing firing temperature or firing time (*a*) the size of rutile particles showed a greater increase in size than anatase particles, (*b*) the amount of anatase crystals decreased and the amount of rutile crystals increased, and (*c*) the color change from blue white to cream white was indicated.

The change in color seems to be related to scattering of blue light by small particles at lower temperatures or shorter times of firing. As the size of opacifying particles increased, the scattering of blue light decreased, and the characteristic absorption of the visible light in the shorter wave lengths was more apparent. With the enamels containing both anatase and rutile crystals, a sharp change in color with different firing temperatures was associated with the anatase particles being the predominant opacifying material at lower temperatures and the larger rutile crystals being predominant at higher temperatures.

15. *Business Session*

Thursday Forenoon, April 29

16. *Mottling Cover-Coat Enamels*

By George Sirovy and Edmund P. Czolgos: Century Vitreous Enamel Company, Chicago, Ill.

Decorative mottle patterns, composed of colored stirations interwebbed with relief backgrounds of contrasting colors, were developed in cover-coat enamels by precipitating out incorporated metallic coloring salts.

17. *Study of Effect on Molten Vicosity of Refractory Mill Additions to Steel Ground-Coat Enamels*

By B. D. Bruce and A. V. Serafinski: Chicago Vitreous Enamel Product Company, Cicero, Ill.

A method for measuring viscosity of enamel glasses by a rotating cylinder method is described.

The viscosities of three ground-coat enamels were determined individually and also in combination as they are normally used in the enameling industry. Combinations of the three ground coats were tested with varying amounts of the three refractory mill additions most widely used in steel ground coats, namely, silica, feldspar, and nepheline syenite.

Temperature-viscosity curves showing the relative effect on molten viscosity of the three materials were plotted.

18. *Apparatus for Direct Measurement of Color and Color Difference*

By Richard S. Hunter: Henry A. Gardner Laboratory, Incorporated, Bethesda, Md.

A new photoelectric tristimulus instrument that gives values of color and color difference directly on three scales has been designed. These three scales are similar to the *a*, *b*, *L* scales proposed by Scofield[1] from his improvement of the uniform scales proposed by Judd[2] and Hunter.[3] On the *a* scale, plus values measure redness while minus values measure greenness. On the *b* scale, plus values measure yellowness and minus values measure blueness. The *L* scale is the lightness scale corresponding to reflectance. The unit of measurement of each of the three scales approximates the National Bureau of Standards unit of color difference. This unit was designed by Judd[2] to measure the maximum permissible color tolerance between two samples supposed to be a commercial match. Measurements with the new instrument thus show whether a color difference between two specimens is more or less than that usually permitted in a color match. Readings from the instrument are given on three separate dials. These dials can be set to a standard color and the departure from standard of the colors of the specimens can then be observed by galvanometer deflections.

F. R. Porter, division trustee, general chairman of 50th annual meeting

The new instrument has proved to be capable of detecting color differences of about two tenths of an N.B.S. unit, but it suffers the weakness of all photoelectric tristimulus colorimeters when it comes to the measurement of color differences between samples of similar color but different spectrophotometric curves. Because the source-filter-photocell combinations used in the apparatus do not perfectly duplicate those of the standard observer for colorimetry, color differences seen by the instrument are not exactly those seen by a normal observer.

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[1] Francis Scofield, "Method for Determination of Color Differences," *Nat. Paint, Varnish, Lacquer Assoc., Sci. Sect. Circ.* No. 664 (July, 1943).

[2] D. B. Judd, "Specification of Color Tolerances at National Bureau of Standards," *Am. J. Psychology*, 52, 418 (1939).

[3] R. S. Hunter, "Photelectric Tristimulus Colorimetry with Three Filters," Circ. C429, *Nat. Bur. Standards Circ.*, C429, (July, 1942).

19. *Improved Apparatus for Gloss and Reflectance Measurement*

By Richard S. Hunter: Henry A. Gardner Laboratory, Incorporated, Bethesda, Md.

An improved apparatus for measuring gloss, reflectance, and other optical properties of materials has been developed. This apparatus is based on a single measuring unit and a variety of exposure heads that may be used with this unit for optical measurements with different geometric and spectral distributions of light. There are thus separate exposure heads for 45°, 0°, reflectance, 45° specular gloss, 60° specular gloss, transmission, and other measurements. A small lamp that does not overheat the two or more barrier-layer photocells is used in each exposure head. Currents from these photocells are taken to the measuring unit where resistance settings are employed to balance the unknown and comprison photo currents in such a way that an indication of the factor being measured is obtained. Attention has been focused on the development of (1) a thoroughly reliable technique for making measurements with barrier-layer photocells and (2) flexible devices for handling the many different materials that are evaluated for appearance. Special attention has been given to the designing of exposure heads for making accurate, reproducible measurements of gloss that will agree from one instrument to another.

Thursday Afternoon, April 29

20. *Factors Affecting Reproducibility of Flow Button Test*

By W. J. Plankenhorn: Department of Ceramic Engineering, University of Illinois, Urbana, Ill.

A study was made of the factors influencing the flow characteristics of fusion buttons formed of conventional cobalt ground-coat frits. To insure reproducible results it was necessary to control accurately (1) the material being tested, (2) the dimension and weight of the pellets, (3) the method of supporting and rotating the samples, (4) the time of heating in the horizontal and vertical positions, and (5) the furnace temperature. Reasonable variations in particle size, fineness distribution, pressure of forming the buttons, gauge of the metal plate for holding the specimens, and coating applied to protect the specimen holder were found to have little effect upon the results obtained. Suggestions are made for the possible formulation of a standard test procedure.

21. *De-Enameling*

By G. H. Spencer-Strong: Pemco Corporation, Baltimore, Md.

A review of the history of de-enameling is presented together with an outline of the most satisfactory methods in use. The advantages and disadvantages of de-enameling methods are compared, and recent developments are discussed.

22. *Some Low-Temperature Enamel-Type Glasses*

By W. G. Lawrence and Reta Farnham: New York State College of Ceramics, Alfred, N. Y.

Studies were made of the glassforming characteristics of certain known eutectics and mixtures thereof. Some of the compositions formed clear glasses at temperatures as low as 1150°F.

In addition to complete list of papers for the Enamel Division, porcelain enamelers may be interested in the following papers selected from other division programs:

Refractories division

Tuesday Forenoon, April 27

2. *Selection of Refractories for Electric Furnaces*

By L. L. Gill: Technical Department, Harbison-Walker Refractories Company, Pittsburgh, Pa.

Wednesday Forenoon, April 28

14. *Microscopy of High-Temperature Phenomena*

By Henry N. Baumann, Jr.: Carborundum Company, Niagara Falls, N. Y.

The high-temperature microscope of the Research Laboratory of the Carborundum Company is described. The optical design, new in principle, is shown, and its incorporation into a practical thermal microscope is detailed. The principles and practices of thermal microscopy, including cinemicrophotography, are discussed and their applications in ceramic and refractory experimental work are indicated.

Thursday Forenoon, April 29

25. *Properties and Uses of Pure-Oxide Heavy Refractories*

By O. J. Whittemore, Jr.: Norton Company, Worcester, Mass.

Thermal conductivity, high-temperature load-bearing resistance, reheat shrinkage, and porosity were determined on new "pure-oxide heavy" refractories of alumina, magnesia, and stabilized zirconia refractories to at least 2300° C. The thermal conductivity of alumina refractories was found to vary directly with density, and four mixtures are described with conductivities ranging from 6 to 18 B.t.u. per hour per sq. ft., in. per °F. at 1800°F. Stabilized zirconia refractories, although twice the bulk density of fire-clay brick, have lower thermal conductivity.

Thursday Afternoon, April 29

26. *Crystal Chemical View of Reactions between Crystalline Ceramic Materials and Metals*

By L. D. Hower and H. F. G. Ueltz: Rutgers University, New Brunswick, N. J.

Reactions between various ceramic materials and metal powders are used in an attempt to determine some fundamental aspects involved in coating metal parts with ceramic refractories. Ionic oxides, such as MgO and Al_2O_3, have been heated with various metal powders, such as Fe, Ni, Co, in oxidizing and reducing atmospheres; the data were obtained with X-ray diffraction and microscopic observation. The results are interpreted from the standpoint of bond types and structures.

Glass division

Wednesday Afternoon, April 28

15. *Surface Properties of Glass as Affected by Heavy-Metal Ions*

By W. A. Weyl: Glass Science Research Foundation, State College, Pa.

The participation of certain heavy-metal ions in the structure of crystals and glasses differs from those of Mg++, Ca++, and other glass constituents which have the structure of noble-gas atoms (eight outer electrons). Not only Pb++, Sn++, but Cu++, Co++, and Ni++ have a tendency to form asymmetrical groups in which the metal ions are not surrounded symmetrically by the neighboring oxygen ions. The influence of these asymmetrical groups on some properties of glasses is discussed. Surface properties, such as surface tension, adhesion to metals, friction of the glass surface and its resistance to weathering, can be greatly changed by bringing heavy-metal ions into the surface layer.

Structural clay products division

Wednesday Forenoon, April 28

12. *Natural-Gas Outlook for the Ceramic Industry*

By F. T. Rainey: Ohio Fuel Company, Columbus, Ohio

The reserves, production, and increased use of natural gas during the next few years are discussed. The development of long-distance transmission lines and the various operating characteristics of the natural-gas industry to secure a more adequate supply of fuel at reasonable prices for the consumer are also described.

This paper will be followed by a general discussion concerning the fuel situation and its relation to the future of the ceramic industry.

"THAT GUY AIN'T HUMAN"

How to choose the correct type
of porcelain enamel for specific applications

Part II

By J. E. Hansen • FERRO ENAMEL CORPORATION

WHEREAS the first part of this article dealt with physical characteristics of enamels, the second part presents some specific applications of enamels.

Enamels for kitchen utensils

Enamels for kitchen utensils should have good resistance to thermal shock, low solubility in boiling acid, and good impact resistance.

Zirconia frits usually do not fulfill these requirements; antimony-opacified cover coat frits of low coefficient of expansion and a fair degree of acid resistance are capable of meeting the minimum requirement of the Enameled Utensil Manufacturers Council of 0.0125 grams solubility per square inch of wetted surface on multiple coated ware.

The titania frits give low solubility and excellent thermal shock results, the latter because of low application weight and favorable low coefficient of expansion.

Since resistance to impact depends primarily upon the thickness of coating of the enamel, and increases as the thickness increases, it follows that the thinly applied titania enamels do not excel in this respect. However, the resistance to impact is still better than that of most enamels, and when damage does occur, the break is small in area.

Enamels for gas and electric ranges

Porcelain enamel is used as the finish for gas and electric ranges because it is pleasing in appearance to the homemaker, and because it is sanitary and easily cleaned.

For many years, ordinary non-acid-resisting enamels were used on all surfaces because of the greater workability and superior covering power. However, most leading manufacturers now finish at least the stove top in acid-resisting enamel. This eliminates complaints from the customer whose stewed tomatoes accidentally boiled over, or who thoughtlessly placed a fruit-juice-coated spoon on the stove top during jelly making or preserving season. The finish may consist of a full coat of acid-resisting enamel, or an overspray may be used over an undercoating of opaque non-acid-resisting enamel.

The finish should rate at least Class A according to the Porcelain Enamel Institute acid-resistance test. Class AA is preferred.

With the improved workability of the titania-type acid-resisting enamels and their superior covering power, a few manufacturers now are finishing all white exterior parts of their ranges with acid-resisting enamels. From the standpoint of giving the customer a better product, this practice is to be recommended, but limitations on the amount of titania enamel available and difficulties in controlling color have prevented wider adoption of the practice. As these limitations are overcome, the use unquestionably will be extended.

Pans or shields surrounding gas burners often are finished in dark ground coat which has been oversprayed on the face side with black enamel to improve the appearance. While such practice apparently is satisfactory, acid-resisting ground ground coat can be used and is recommended.

The pans underneath electric heating elements are also enameled by some manufacturers. Acid-resisting enamel of at least a moderate resistance to thermal shock is recommended.

Oven linings are commonly enameled in stippled ground coat only, to protect against rusting, and such practice has been regarded as satisfactory.

Enamels for resistance to crazing

Crazing (or bona fide cracks in the finish, as distinguished from hairlines or tearing) is basically the result of a coefficient of expansion of the enamel which is too high. It may be accelerated or aggravated by cyclic thermal changes which eventually cause a physical breakdown, or a crack or series of cracks in the area subjected to the greatest strain.

An example is the crazing which occasionally is encountered on cast iron stove parts on areas near the fire box. Crazing occasionally is also a problem on formed metal tops for electric ranges, on areas surrounding the heating units.

To resist or eliminate crazing, a cover coat enamel of low coefficient of expansion is recommended; however, if the expansion coefficient is too low, failure on the radii of flanges surrounding the heating unit holes may result, so a compromise is necessary.

Enamels for exteriors of refrigerator cases

Enamels for the exteriors of either domestic or commercial refrigerator cases ordinarily are of the opaque non-acid-resisting type, and have been found to be commercially satisfactory. There undoubtedly will be exploitation of the titania-type acid-resisting enamels on these appliances and fixtures because of the inherent advantages of the thinner application

weights possible and the added advantage of acid resistance.

Enamels for refrigerator interiors

Refrigerator interiors usually are coated with non-acid-resisting enamel, except on the bottom horizontal surface where acid resistance is desirable to protect against accidentally spilled sour milk or acid fruit and vegetable juices.

Vegetable storage or hydrator pans should be finished in acid-resisting enamel to protect against juices from acidic fruits or vegetables.

It is recommended that enameled home-freezer units, refrigerator evaporators, or other surfaces where condensate forms and freezes be finished in enamels of minimum bubble-structure characteristics. It follows that any mill addition of bubble-structure-forming characteristics likewise should be avoided.

Enamels for washing machine tubs and component parts

Porcelain enamel finishes on washing machine tubs and component parts of automatic washers are subjected to the action of hot water, soap, and alkaline washing compounds such as tri-sodium phosphate, tetra-sodium pyro-phosphate, calgon, borax, sal soda, and, occasionally, even lye.

When we remember that boiling solutions of lye or caustic soda are used as de-enameling agents, it is not remarkable that even dilute alkalies at the temperatures used for household laundry work will attack some types of enamel severely.

Washing machine parts certainly should be finished in enamels possessing alkali resistance. Most of the white cover coat enamels used for this purpose have been satisfactory. Parts not finished in white, such as the "spinner" on the automatic washer, still need an alkali-resistant coating. The usual ground coat enamel, particularly the soft type, is not satisfactory as the finish. It is recommended that either an over-spray enamel of demonstrated alkali-resisting properties be used over the usual commercial ground coat, or that a special ground coat of demonstrated alkali-resisting properties be used.

Certain hidden surfaces on automatic washing machines which are left in ground coat finish only are also exposed to the solvent action of the alkaline laundry water.

As yet, no standard test has been devised by enamelers to measure "alkali resistance", nor any standards set as to what constitutes good or acceptable alkali resistance.

One test used, recently described in *The Enamelist*,[3] is a modification of a test used to determine acid resistance[4] in which a boiling 5% solution of tetra-sodium pyro-phosphate is used as the alkali test agent.

Enamels for table tops

Enamels for table tops and "breakfast sets" should be acid resisting. This includes any stencil or silk screen designs used for decoration.

Occasionally, colors and designs are produced in non-acid-resisting enamel, and a transparent acid-resisting overglaze then applied. Such practice can be recommended.

Table top enamels should possess a reasonable degree of resistance to abrasion and scratching. Most acid-resisting enamels inherently have this resistance, but the use of mill addition materials which cause excessive bubble structure is to be avoided. This applies particularly to opacifiers which result in gas-opacification and to clays which contain large amounts of gas-forming organic material.

The titania-bearing enamels are quite resistant to scratching and abrasion and have found wide acceptance as table top finishes.

Enamels for plumbing ware

The same remarks apply for sinks, bath tubs and lavatory basins as for table top enamels; the finishes should be acid resisting and resistant to abrasion. The degree of acid resistance should not be less than PEI Class A, preferably Class AA.

Enamels for signs

Advertising, store identification, and street signs finished in porcelain enamel are often guaranteed for ten years. It is obvious that the enamels used should be "weather resistant". Only those frits which have been demonstrated to be resistant to general atmospheric conditions should be used. For signs in industrial manufacturing districts, enamels of a least semi-acid resistance (PEI Class B, or better) may be required to resist attack from acid gases.

It is advisable not to use soft "black-edge enamel" formulated from ground coat frits for black areas on signs. Such enamel usually is not weather resistant.

Enamels for architectural panels

Like enamels for signs, architectural enamels should be weather resistant, but since matte finishes are often required, the choice of frits to use is considerably narrowed.

A study of the weathering resistance of vitreous enameled architectural panels was reported upon by the National Bureau of Standards in 1942.[5]

The study involved 864 panels, representing 14 types of porcelain enamels, some of which it had been anticipated would not be satisfactory. At the end of the first year of exposure at four locations selected for different climatic conditions, over half of the panels showed no visible weathering effect, and in no case did weathering produce any failure of the porcelain enamel to protect the underlying metal from rusting.

The full-matte enamels were found unsuited for architectural use where appearance is important—because of fading and difficulty in cleaning. Mild facing, found on some non-acid-resistant colored enamels, was associated with a minute pitting of the porcelain enamel surface. This probably was caused by the presence of acid-forming gases in the atmosphere. The finishes of high acid resistance did not show this effect.

Weathering of the panels was found to be more pronounced at those locations where there was a relatively high concentration of combustion gases, and less severe where there was a practical absence of these gases in the atmosphere.

From these observations, it is rec-

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Porcelain enameled garden furniture

after eight years of outdoor use

THE two chairs shown in the accompanying photograph, together with the remaining two of a set of four, have been in constant use at the home of Ernest Hommel, president of The O. Hommel Company, Pittsburgh, since the spring of 1940.

Exposure to weather

For three years the chairs were left out in the weather during both summer and winter. For the remaining years they were exposed to the elements during the summer, but were stored inside during the winter. Mr. Hommel reports that they have retained their original high gloss despite this type of use.

Stamped out of 18 gauge steel (automobile stock), the chairs were fabricated by the standard procedure used by garden furniture manufacturers, without special attention to design for porcelain enameling. The backs of the chairs, seats and arm rests were prepared for porcelain enameling by normal pickling room procedure, except for dipping in a special "Hommelaya" solution before neutralizing. They were then enameled in one coat direct to the steel and fired at 1560° F. Colors are forest green and royal blue.

In assembly, the pieces were bolted together in the same manner that they would have been assembled were they painted — that is, without the normally recommended insertion of shock-absorbing washers.

After having been used in a manner typical to that to which garden furniture is usually subjected, the porcelain enameled parts of these chairs have required no maintenance whatever. The spring steel bands were repainted.

Not only should this photographic evidence be of interest to manufacturers of outdoor furniture, but it also serves as a glowing example of the durability of porcelain enamel under extreme service conditions.

The youthful model demonstrating the durability of porcelain enameled garden chairs is the owner's daughter, Eda. The chair at the left is royal blue; the one at the right, forest green.

Edward Winter, nationally known artist, stands in front of one of the three murals he executed for Herman Pirchner's Alpine Village restaurant.

Porcelain enameled murals

incorporated in theatre restaurant front

AMONG the first porcelain enameled murals to be incorporated in a building front are the three installed recently at Herman Pirchner's Alpine Village restaurant, Playhouse Square, Cleveland, Ohio.

An Austrian by birth, Pirchner was interested in decorating the restaurant front in the same Tyrolean motif carried out in the interior decoration of Cleveland's new theatre restaurant.

At the Cleveland Museum of Art, Pirchner became familiar with the enameled works of Edward Winter, nationally known artist, and felt that porcelain enamel should be the natural medium for the full color and design he wanted in his restaurant front decorations.

Winter was commissioned to execute the pictorial panels. His sketches of the proposed murals were okayed by Pirchner and J. Milton Dyer, Cleveland architect, who designed the building facade. (Dyer also was the architect for the Cleveland City Hall and many bank buildings in that city.)

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Frit making in Canada

photo story of Canadian frit manufacturing methods and equipment

By H. D. McLaren • VICE PRESIDENT, IN CHARGE OF PRODUCTION, FERRO ENAMELS (CANADA) LTD.

ALMOST one year to the day after ground for a new plant had been broken, Ferro Enamels (Canada) Ltd. commenced manufacturing porcelain enamel frit at Oakville, Ontario, on April 1, 1947. However, the entire building programme, including offices and laboratories, was not completed until last autumn, when the frit plant at Ottawa, in operation since 1930, was closed and the entire personnel moved to Oakville.

A remarkable growth in the frit requirements of Canada's enamelling industry and a lack of space for expansion at Ottawa had necessitated the move. Though frit is used in plants as far west as Vancouver, British Columbia, and east as far as Amherst, Nova Scotia, a large majority of users are located in southwestern Ontario, and for this reason, Oakville, situated mid-way between Toronto and Hamilton with excellent rail and highway facilities, was selected.

In the factory, which is 220′ long by 66′ wide and of single storey construction, emphasis has been placed on generous ceiling heights and ample fenestration to provide bright and comfortable working conditions. Floors are of concrete throughout with cement block construction to sill height and asbestos board above windows to the roof line.

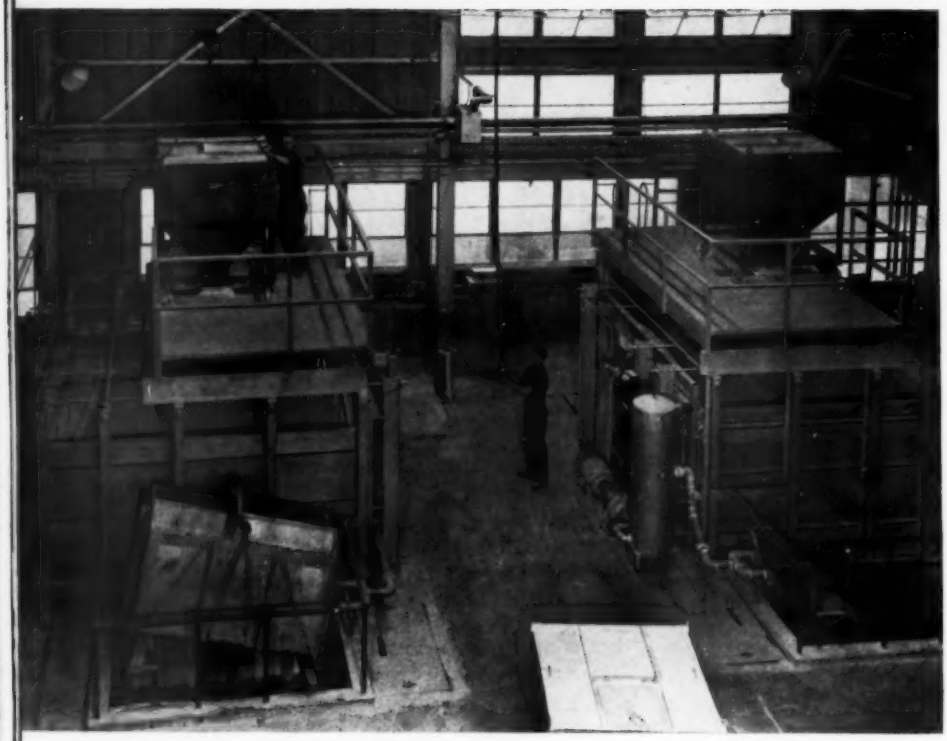
Continuous flow layout

The layout of equipment provides for continuous flow from one end of the factory to the other, and a railway siding with loading platform running the entire length of the building enables five box cars to be accommodated at one time. Raw materials are unloaded into a hopper set into the platform and feeding a bucket elevator which, in turn, feeds either of two belt conveyors which carry the materials to bulk storage bins. There are sixteen of these bins in two rows of eight, each bin having a capacity of approximately 50 tons.

Batches are weighed direct into a removable hopper set on a scale car which runs on rails under the bins provided with transfer tracks and turntables, and carries the weighed batch to a 50 cubic foot mixer. The weigh hopper is elevated by an electric hoist and discharged, by means of gravity and an electric vibrator, into the mixer. The mixed batch is discharged into a portable hopper at floor level.

Smelting is carried out in a 40′ x

Handling skid loads of frit in the storage area.



Left: Photo shows two of the plant's frit smelters.

Below: Weighed batch being charged into mixer.

Left below: Weighing raw materials from storage bins.

66′ bay with 30′ roof and a travelling crane for transporting the mixed batch to the smelters and the fritted batch to the driers. The latest type of batch type smelter, fired by oil and with automatic temperature control, is employed. There are at present three of these units, with provision for a fourth, giving a capacity of 18,000,000 pounds of frit a year and a potential capacity of 24,000,000 pounds. The nine-acre site provides ample space for future expansion.

The frit is dried on continuous gas-fired rotary driers which discharge it over permanent magnets onto vibratory feeders, where inspection is carried out before packing in multi-wall valve-type paper bags, 100 lb. net weight.

The dried frit is placed on pallets and transported by a gas-powered fork truck to the storage area where the pallets are stored in three decks. A fork truck is also used for moving the palletized frit to the loading platform whence shipment is made

Right: Section of the chemical laboratory at Oakville.

Below: Frit batch being charged into rotary drier.

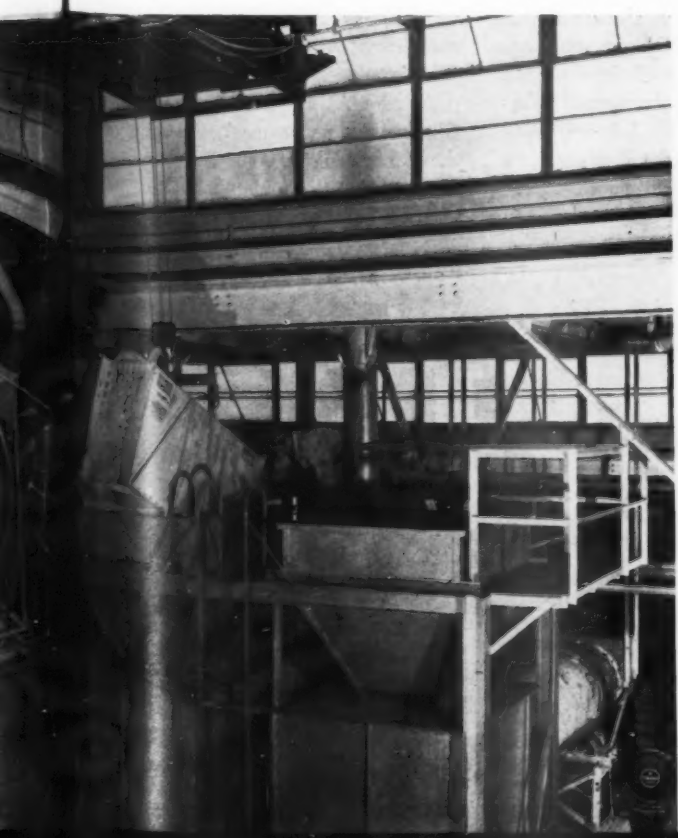
Right below: Enamelling furnace in control laboratory.

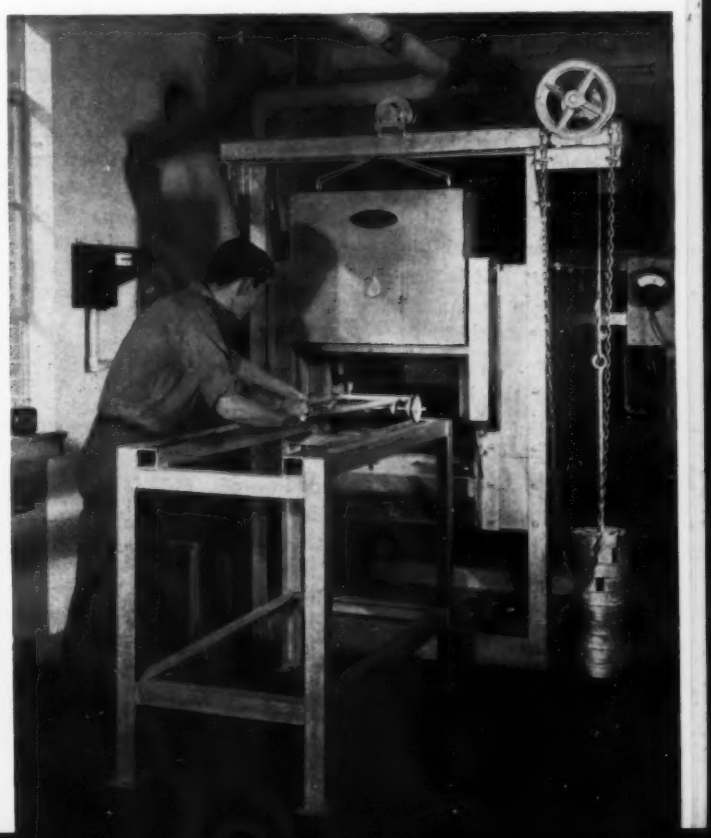
by railroad or highway transport.

Frit samples from each smelt are tested in a control laboratory equipped with porcelain jar mills, spray booth, electric drier, and two electric enamelling furnaces. Fired samples are checked by chemical and physical tests and must meet rigid specifications before the frit is released for shipment. Likewise, each incoming shipment of raw material is sampled and analysed in the chemical laboratory, and must meet specifications before it is used in a frit batch.

The factory proper includes a milling department with a capacity of 500,000 lb. annually, where dry process and pottery glaze frits are ground for customers who prefer to receive them in powder form.

In addition to its frit manufacturing facilities, the plant includes a colour department which matches colours and blends oxides for porcelain enamels as well as glaze stains and ceramic colours of all kinds.





Reports on enamelers club meetings

Central Club meets in Cleveland

THE Allerton Hotel in Cleveland, Ohio, was the scene of the get-together of the Central District Enamelers Club, February 13.

John Lannan, program chairman, introduced the first speaker, R. C. Todd, vice president, Armco, who presented a talk on the steel situation today *(see "The Sheet Steel Problem," September, 1947 finish)*, with reasons for steel shortages. He also touched on various pieces of legislation dealing in the production and distribution of steel. The speaker presented facts and figures dating back in the history of steel as to production and cost.

Industrial designer likes enameled surfaces

The next speaker was Walter Perl, industrial designer, Westinghouse Electric Corp., whose talk was titled "Future Design of Enameled Parts."

In his speech, Perl stated "I like enameled surfaces! Why? Primarily because the texture and surface attained with this medium stands second to none. An enameled surface feels clean and looks clean — its texture is associated with the finest vases and pieces of china. It has an inherent quality of a gem-like sparkle. There is little doubt about its durability and imperviousness to dirt. It can be both massive looking and still have a delicate fineness.

" . . . There are many elements that the industrial designer has to work with; texture, color, line, mass and proportion are all important. . . .

" . . . Generally speaking, in products such as ranges, refrigerators, sinks, etc. used in the kitchen, white will always remain *the* color. A common blend with other things in the room is a necessary factor. The color of the linoleum, the color of the walls and ceiling, and the housewife's taste are all contributing factors. Therefore, I think white will remain good for a long time to come. It enhances other objects and colors seen with it. Interiors may stay in pastel shades, such as the ivories, greens, and light blues."

The third speaker was L. A. Johnson, Chicago Vitreous Enamel Product Co., who discussed "Evaluating the Workability of Sheet Steel Ground Coats." His address was illustrated with 20 slides showing properties of various ground coats as to sag resistance, copperheading and many properties which were evaluated in specific ground coat studies. *(See "Eastern Enamelers Meet in Philadelphia — Talk Ground Coat Evaluation and Discuss Unusual Plant Problems," January, 1948 finish.)*

Chicago enamelers hold joint meeting with ACS section

MORE than 140 persons attended a joint meeting of the Chicago District Enamelers Club and the Chicago Section of the American Ceramic Society, February 28, at the LaSalle Hotel. Following a combined luncheon, the two groups held separate business meetings before convening for a general session.

At the enameler's business meeting, President Wayne Deringer appointed Jerry Hofstetter as chairman of a committee to plan the annual Maypole Party. This was followed by a report that ample contributions were received to finance a booth at the Chicago Technical Conference and Production Show. Then Ralph Cook, chairman of the nominating committee, presented the following slate of men who were unanimously elected to serve for 1948:

President, Jerry Hofstetter, Ferro Enamel; Vice President, George Tuttle, Benjamin Electric; Secretary and Treasurer, Ed Bolin, Chicago Vitreous; Assistant Secretary and Treasurer, Fred Petersen, University of Illinois.

At the ACS Section meeting, Charles Pearce, general secretary of the American Ceramic Society, announced that the Society's 1948 budget will be about $110,000 as com-

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D. G. Bennett and E. E. Howe, guest speakers at Chicago Enamelers Club meeting, discuss trends in the porcelain enameling industry.

pared to about $50,000 before the war. He stated that ACS members now total about 4000.

High temperature ceramic bodies, metal coatings

The first speaker on the general session program was Dwight G. Bennett, special research professor at the University of Illinois, whose topic was "The Development and Testing of High Temperature Ceramic Bodies and Metal Coatings." However, Professor Bennett did not discuss his topic; instead, he introduced Terry F. Newkirk and Robert F. Kimpel, special research associates, who presented two different papers on the subject.

Kimpel's abstract of his talk, entitled "Tensile and Transverse Strength Determinations upon Ceramic Oxide Bodies at Elevated Temperatures," follows:

"A partial investigation of the tensile strength of two high beryllia bodies at 1500° F. was made. Data were obtained from round 5.25 inch specimens which had a neckdown section one-half inch in diameter and two inches long. The specimens and stainless steel grips were enclosed entirely within nichrome wire wound furnace. The load was applied with a 'Dillon Type K Tensile Testing Unit' at a motor driven rate of 2250 psi per minute.

"Two factors, specimen warpage and absorption (porosity) were studied for their effect upon tensile values. Center line plots were made of each specimen by means of a special device developed to measure specimen warpage. It was thus possible to predict, in most cases, where the rupture in a specimen would occur. Though both warpage and absorption are critical in determining the inherent tensile strength of ceramic bodies, results seemed to indicate that, for the bodies studied, absorption has a greater effect upon strength than does warpage. However, both factors should be maintained below an established minimum.

"Transverse strength tests were made at room temperature and at 1500° F. to determine strength retention characteristics. Results at 1500° F. indicated no loss of strength for the body tested."

The title of Newkirk's paper was "The Evaluation of Ceramic Coatings and Their Effect on the Strength of Metal Parts Subjected to Elevated Temperatures." The author's abstract of the paper follows:

"A study was made of methods of evaluating the degree of protection given to low carbon and stainless steels by refractory ceramic base coats. Visual and microscopic observation of coated and uncoated plates subjected to elevated temperatures for various time intervals was found to be indicative, but a method of obtaining quantitive values was desirable. Intermittant weighing of

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Earl Shaner talks before Eastern enamelers meeting

THE featured speaker at the Eastern Enamelers Club meeting held at the Sylvania Hotel, Philadelphia, February 21, was Earl L. Shaner, editor in chief of *Steel* magazine and president of Penton Publishing Company, Cleveland, Ohio.

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Earl Shaner, guest speaker at Eastern Enamelers Club meeting, discussed his recent trip around the world as a member of the United Nations ReparationsCommission.

An interesting section of Shaner's talk included a brief summary of his round-the-world trip as a member of President Truman's United States Reparations Commission. The Commission traveled by private plane, covering 49,500 miles in 247-½ flying hours. Their itinerary included Hawaii, Wake, Tokyo, Korea, Manchuria, Formosa, The Philippines, Calcutta, Karachi, Cairo, Paris, Berlin, Neuerenberg, Essen, Vienna, England, Iceland, Newfoundland, etc.

He described the distressing and depressing conditions in many of the cities and countries covered, and emphasized the "bad" situation in Korea and Manchuria. His conclusions were that the United States has the best of everything, and is the only major place in the world with a reasonable distribution of wealth.

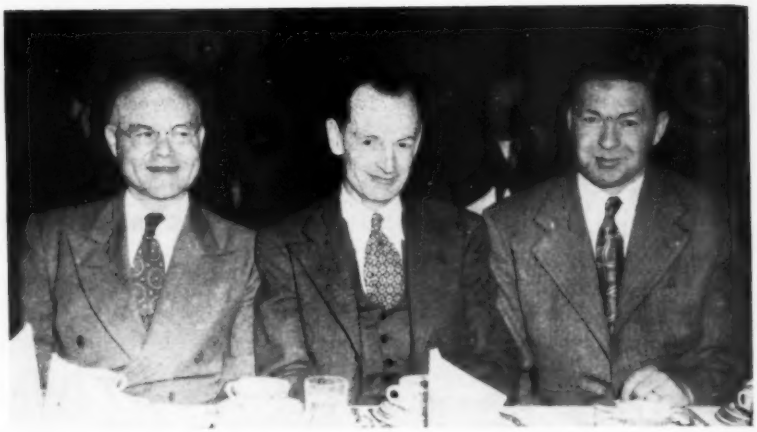
In referring to the Marshall Plan, he stressed the importance of administration. In connection with controls in the steel industry, he expressed the personal opinion that it would be "a shame" to go into any elaborate set of controls. Shaner feels that the country's best asset now is high production, and that formal allocation, price controls, etc., will definitely slow down the industrial machine to the pace of Washington bureaucracy.

Against controls

"In my opinion," said Shaner, "the steel consumer is going to get a greater amount of steel without controls than under an elaborate control system. We should stay away from controls and try to improve our best methods of utilization."

Reasons for steel shortage

Among the reasons indicated for the present shortage of steel were



SNAPSHOTS of Eastern District ENAMELERS

Top row: Left to right, Bureau of Standards' Mary Ann Mason and Dwight Moore; George Lantz, Bally Metal Products, Jim Gould, O. Hommel Co., and Phil Bennett, The Miller Co.

Second row: George Dougherty, Wincroft Stove, and Kenneth Dougherty, Prizer-Painter; Harry Johnson, Standard Porcelain.

Third row: Woody Wilson, Ferro Enamel, and Joe Boehler, Heintz Mfg.; Baltimore Porcelain Steel's Bill Winand and Paul Grigg.

Bottom row: Clarence Konemann, Caloric Stove, Frances Parady, The O. Hommel Co., and George Ecke, Prizer-Painter; Enamelers registering for meeting.

finishfotos

unprecedented demand and elimination of some of the smaller sources of steel production. It is a mistake to consider present demand a normal demand. Excessive building of steel facilities at present would mean three times normal cost, and they would arrive too late for the present market. Price of steel from these plants would be necessarily excessive.

He pointed to added capacity of 3,500,000 tons from the first of 1947, exclusive of present plans. A point was made of the fact that a number of large users of steel have purchased small mills, taking them out of production for general distribution. There have been eight or ten small plants taken out of the market in this way. Present basing points for steel have caused the mills to center activity in home markets.

Ingot conversion, scrap trading and the gray market came in for discussion.

As to uncertainties affecting the present steel situation, Shaner pointed out that the exact amount of steel required for the Marshall Plan is uncertain. It is apparent that the speaker felt that the Marshall Plan should be used as a stimulant to help the recipient countries to help themselves and to get business off dead center—then, the help should be discontinued.

Any long range benefit will result from helping private business.

Survey report

In referring to a recent survey by the magazine *Steel*, the speaker said that 31% of the steel users reporting got as much steel in 1947 as needed, while 69% did not. All but 8% of those reporting indicated sharply increased steel needs for 1948.

In summarizing the facts, Shaner said, "'48 will not be much better nor much worse than '47." His personal hunch is that '48 may be *slightly easier* for steel users.

For sake of comparison, he said that our troubles with prices, supply, labors, etc., stacked against the troubles of the rest of the world seem trivial. He reiterated the fact that the United States is the only place to which the rest of the world can turn.

After canvassing the group, Nathan Klein, club president, announced that the next regular program meeting will be held in May, and that the annual clam bake will be scheduled for September.

Fuel oils discussed at Pacific Coast enamelers meeting

By Malden Grange Bishop

SIXTY-FIVE members of the Pacific Coast Enamelers Club held their first 1948 meeting at Scully's Cafe, Los Angeles, February 20. President M. E. Blackburn, superintendent, California Metal Enameling Co., presided and welcomed two new members—J. E. (Ed) Hansen, Ferro Enamel Corp., and William (Bill) Weber, formerly with Mullins Manufacturing Co., Salem, Ohio.

H. B. (Berney) Keating, combustion engineer of Shell Oil Co., San Francisco, spoke on "Fuel Oils and their Application in the Enameling Industry." Highlights of Keating's informative talk, as reported by H. G. Burlingame, ceramic engineer, California Metal Enameling, included these points:

Fuel classifications. There are three classifications of fuels — gases, distillates, and residue fuels. At the present time, there are two sets of specifications for fuel oils. These are (1) Commercial Standards, which were drawn up primarily for the East Coast and are constantly being changed, and (2) Navy and Federal Specifications, which are patterned after the Commercial Standards but govern consecutive deliveries. West Coast specifications follow very closely the Commercial Standards, even though they are made up for the products being refined.

Tests for fuel oils. There are five pertinent tests for fuel oils. These are (1) gravity, (2) flash — the measure of ignitability, (3) fire point, (4) ignition temperature — the temperature at which the fuel will burn by itself, and (5) pour point — the temperature at which the oil will no longer flow. The ignition temperature varies from 1100° F. to 1200° F. according to the hydrocarbons in the fuel. The pour point, of particular importance in cold climates, varies according to the wax or paraffin content of the oil.

Btu content of fuel oils. Gravity is the measure of the heat content of the oil. Heat content of crude oil can be measured by the gravity, and this test becomes important to the producer when prospecting new fields. As fuel oil becomes heavier, the Btu content increases. Although the enameler is interested in buying heat, the weight of the oil he uses may be governed by the particular burning conditions in his plant.

Distillate type fuels. There are two types of distillate fuels sold on the West Coast — stove oil, PS-100, and Diesel oil, PS-200. These two types are very similar, having the same gravity and a negligible amount of sediment. The principal difference in them is the distillation range. PS-100 has an end point, the temperature at which it changes form, of 600° F. PS-200 has an end point of 700° F. Both types meet the specifications, CS-1 and CS-2, of Commercial Standards.

Heavy fuels. These are residue fuels, and are listed as PS-300 and PS-400. In these fuels, viscosity versus temperature is the important point. Viscosity, or internal friction, sometimes necessitates pre-heating of the oils to facilitate pumping operations. They are also more difficult to atomize than are light or distillate fuel oils. To reduce the viscosity, the oils are blended at the refinery with a "blending stock."

Sulphur content. The sulphur content of Southern California crude oils is a troublesome point, and the refiners have found no economical

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Production of range platforms . . . . .

A PROGRESS REPORT

By J. B. Simons • SUPERINTENDENT, ENAMELING DIVISION, WESTINGHOUSE ELECTRIC APPLIANCE DIVISION, WESTINGHOUSE ELECTRIC CORPORATION, MANSFIELD, OHIO

The continuing success of the use of titanium bearing killed steel in the production of enameled electric range platforms marks a revolutionary step in mass production enameling for not only home appliances but for a wide range of products. The development of production line techniques is not a "closed book" problem by any means, but our use of titanium bearing killed steel indicates that it is a practical, cost saving and high quality method for enameling. It is out of the experimental stage, and, already, Westinghouse is using it in an ever increasing proportion of range platform, or, cooking top, production.

A current report on an industry problem

Thus a current report on our work with titanium steel is made to the enameling industry so that the results can be made available. We feel that its use can be greatly accelerated by the combined "know how" and facilities of the industry whose capacity for development has been demonstrated in the past few years. Westinghouse entered into a cooperative project on the use of the newly developed steel with the Inland Steel Company to check its application for mass production. The project has been underway for two years and was given a high priority by Westinghouse despite the tremendous conversion program it faced at the end of the war. Our interest was, of course, the advantages of a cover coat directly on steel. We found that two years ago only a few tons of the new steel had been processed and the results both in the laboratory and in the field were at great variance.

Our work on titanium steel began shortly after V-J Day, and by mid 1946 the production proven superiority of titanium enamels forced a decision to drop our previous thinking on the use of other types of enamels directly on the steel. The laboratory results on adherence, impact, torsion, opacity, acid resistance and scratch hardness further substantiated our decision to follow through on the use of titanium steel and titanium enamels.

Range platforms were selected for production because they were the most important from the dollar value, warpage resistance requirements, assembly and field damage vulnerability, acid resistance, hardness requirements and general over all appearance. In short, if titanium steel met

. . . cover coat enamel direct to steel

the test of range platforms, its application on other parts would be relatively easier.

Production runs started in early 1947

The steel company supplied us with enough titanium steel in the spring of 1947 to start test production runs. At this time, some tonnage was sheared, drawn, gas and spot welded, and polished with results comparable to regular vitreous enamel steel. The pickling also achieved standard results, and the spraying of a titanium enamel cover coat at .007 to .006, or about 30 grams per square foot, was no particular problem. These first experimental lots were fired at 30 degrees higher temperature, or, one minute longer, than regular whiteware in order to completely burn down the enamel. This, of course, resulted in a slight off color in the titanium enamels but the color was within commercial limits of variation for range tops. The average thickness of these first lots were .006 of an inch.

From these early runs, several hundred platforms were followed through assembly, quality control shipping tests and to the ultimate consumer with entirely satisfactory results.

The firing requirements of titanium steel were turned over to frit manufacturers and a suitable frit for firing at regular white coat time and temperatures has been developed and produced. With the development of a good frit, more steel has been available and production is now progressing at a round-the-clock basis on range platform tops.

Eight points indicated by current progress

The work, to date, at Westinghouse has indicated that:

1. Titanium bearing killed steel is satisfactory for direct white application.
2. The frit manufacturers must match the steel progress in the development of their materials.
3. Possible improvements in spray equipment should be considered to insure greater smoothness of finish and to promote conservation of materials.
4. Spray booths must receive only clean air, since airborn dirt and grit will mark the new, thinner cover coat.
5. Dryers and conveyors must be clean to eliminate every possibility of dirt coming in contact with the titanium steel prior to cover coat.
6. Furnaces must reduce scale throwing properties through redesign and materials of work carriers.
7. Ultimate cost reduction is certain.
8. If a new development superseded titanium bearing killed steel and titanium enamels, the new development would require the same production line conditions necessary now for titanium bearing killed steel.

The results with titanium steel and titanium enamels are far more promising than the early development days of "one coat white on ground" system, in spite of the imposing list of requirements. The new steel and the frit and their associated production line problems present the first practical answer to a one cover coat system for enameling. Westinghouse considers its work in this field as just the start of revolutionary improvements in porcelain enameling procedures — improvements that will bring higher quality production at a cost lower than the industry could anticipate even a few years ago.

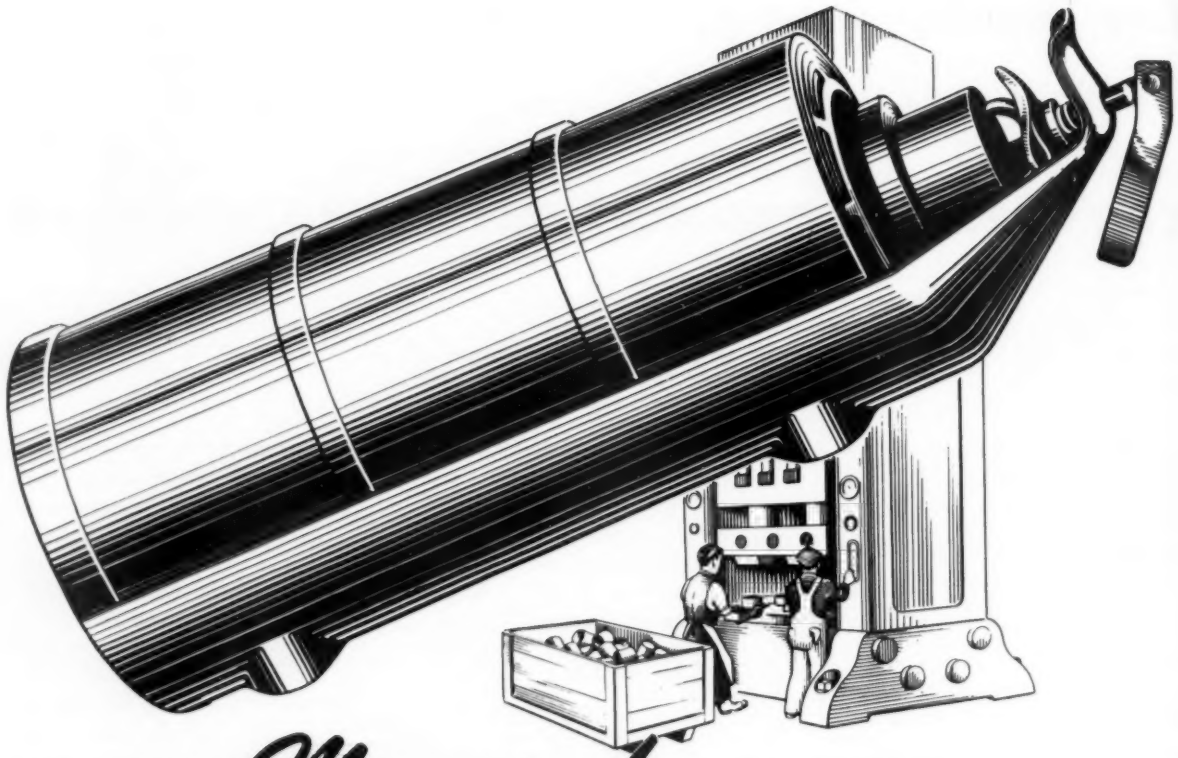
Editor's Note:

In the first issue of *finish* (Jan. 1944), a feature was presented entitled, "Will We Have One-Coat Porcelain Enamel Finishes Applied Directly to the Base Metal?" This feature included expressions of opinion by such leading industry technicians as G. H. McIntyre, F. R. Porter, Richard H. Turk, B. T. Sweely, George Sirovy, and Anson Hayes.

At that time the application of cover coat directly to base metal was in the early stages of development in most laboratories.

We have continued to keep our readers informed concerning new developments in base metal and the newest in frit developments. For instance, the first comprehensive article on titanium enamels, by Andrews and Andrews, was presented in the January, 1946, issue.

In recent months extensive experimentation has been carried on in a number of industry plants. None of those responsible for the effective progress that has been made would want to point to their results as having reached the ultimate goal. There has been, however, much creditable progress and we consider it a privilege to present a progress report based on the work of one of the country's leading porcelain enameling plants. This exclusive release to *finish* represents the first of these reports. Results obtained in other plants will follow in succeeding issues.



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The Washington round-up

By Wilfrid Redmond

CONTROLS on tin and antimony have been extended to May 31, 1948, under the terms of a bill introduced by Senator Taft after the House had approved their continuation for one month. The Taft bill was passed by the Senate without objection and concurred in by the House.

Senator Taft's argument for a three- month extension was that by that time a change in the supply-demand position of some of the commodities covered by the Act may have occurred and it may not be necessary to extend the controls for a long term period. A Senate bill (S. 1807) proposes that the controls be continued to June 30, 1949. Senator Taft said he believed it might be necessary to continue controls on tin at least. Although S. 1807 had been reported out by the Senate Banking and Currency Committee, supporters of the measure were reluctant to bring it up before the Senate because it was known several Senators were opposed to it and might kill it by amendments. The strategy now will be to reopen hearings on S. 1807 and bring in more industry witnesses to testify to the need for continuing controls. Because of the testimony of The Continental Can Co. and two chemical companies in opposition to continuing restrictions on tin, supporters of the bill said that certain senators had received the impression that industry generally was against the bill. This testimony outweighed even a recommendation by the American Iron and Steel Institute that the controls on tin be continued.

Representative Wolcott, of Michigan, chairman of the House Banking and Currency Committee, has announced that his committee will resume hearings on the extension of tin and antimony controls for a longer period, in about two months. At that time, he said, the committee will also go into the matter of the recent order restricting uses of tin plate for food, beer, coffee, and pet food containers. This order went into effect immediately when the stop-gap tin control bill was signed by the President. Its purpose is to save 3,500 tons of tin for the national stockpile.

When the long term bill comes up in the Senate it is believed that an attempt will be made to remove specification controls with respect to tin and antimony. However, in view of the troubled world situation, it is not likely that the Senate will risk a critical shortage of tin. Representative Wolcott said it may be necessary to have the Government operate the Texas City tin smelter for some time in order to build up a stockpile of tin.

Steel program

Several agencies of the Government and the Joint Committee on the Economic Report recently announced investigations of the recent increase of $5 a ton in the price of semi-finished steel. Steel executives appearing before the Joint Committee on the Economic Report, said that rising costs forced them to increase the price of blooms, billets and other semi-finished shapes. Benjamin F. Fairless, of U. S. Steel, said that the increase affected only 10 percent of U. S. Steel production, and therefore could not be regarded as a general increase in the price of steel products. Senator O'Mahoney, of Wyoming, brought out, however, under questioning of Fairless, that the increase would yield an additional profit of $10,000,000 to U. S. Steel this year. He also forced the admission by Fairless that an increase had been announced in the price of structural and tubular steel products for another $18,000,000 increase in income for 1948.

Steel executives denied that there had been any concerted increase in semi-finished steel prices. The increases had been announced on different days, they said, but newspaper reports had given the impression that the announcements had been made simultaneously. Fairless said that no further increases in steel prices are contemplated immediately. He refused, however, to say that there would be no increases this year. Following the hearing, the committee went into executive session, and has made no statement of its findings. President Truman ordered his council of economic advisers,. the Commerce Department, and the Department of Justice to conduct investigations of the steel price increases to determine if they were justified and if there was evidence of concerted price fixing. Reports of the three agencies were expected to be ready before the end of March.

To date, no one in Congress, or in the Administration, has brought out that the reason for the price increase is anticipated ERP business. This is said by informed sources to be the real reason for the uptrend in steel prices. Although the State Department cut down the recommendations of the Paris conference for semi-finished steel to about 500,000 tons in 1948, finished steel requirements of the ERP program, such as structural and tubular may be substantial. The Committee on European Economic Cooperation recommended that steel for the construction of steel making facilities should be imported to a value of $100,000,000. The State Department cut this recommendation to $40,000,000 for 1948. This would appear to involve considerable exports from the U. S. of structural steel.

Voluntary allocation program

The Commerce Department has announced the formation of several industry committees to carry out the purposes of the voluntary allocation program for steel products under Public Law 395, the so-called Taft anti-inflation act. In addition to an overall committee of steel producers, the Office of Industrial Cooperation has had a meeting of pig iron producers and named a committee to work out a program for distribution of this product. A farm machinery committee has also been named, and

meetings have been called to consider formation of industry committees of cast iron pressure pipe and soil pipe producers. The last named committees are the first named in the area of building materials, which is one of the four major categories of scarcity for which steel will be allocated. Although the first meeting of steel producers was called in January, no steel has been allocated as yet under the voluntary agreements programs. It appears that the initial allocation may be made for the freight car program, but this program had already been set up by ODT and all the Office of Industrial Cooperation had to do was formalize it.

OIC has also announced that a meeting of soda ash producers will be held at an early date to set up a voluntary allocation program for this material. The main difficulty encountered by OIC is that the requirements for each item of production in each shortage area are not readily available. Under WPB, CPA, and the other war agencies, these consumption figures were at hand, but this information now has to be accumulated by an industry census. OIC is bringing in a number of experts on each commodity and building up an organization. Many of these consultants and sectional chiefs are former WPB executives. It now appears that consuming industries will have to wait until April at least before it can be determined whether or not the voluntary allocation program will produce any steel. It is doubtful if the President will have data ready before June to go before the Joint Committee on the Economic Report to ask for mandatory controls on the basis of evidence that the voluntary program has been inadequate.

The Republican program is to prevent the enactment of legislation this year reinstituting mandatory controls, except in the case of those already in effect, such as tin and antimony. The Administration policy will be to claim a rising spiral of inflation and ask for allocation and price controls on scarce commodities. The Administration is at present putting forward statistics to prove that prices are still going up while the Republican Congress contends that prices have started a gradual decline.

Steel allocation program

The procedure to be followed in allocating steel under the voluntary agreements program is as follows:

The Secretary of Commerce, with the advice of an Advisory Committee of a steel consuming industry, will submit to the Steel Advisory Committee such program as he believes should receive consideration for the purposes of a voluntary agreement under Public Law 395, together with supporting data which shall include:

The number of manufacturers represented, the special products covered, the steel required by product, by tons and end use; a comparison of the proposed program with the production program, by product of the steel consuming industry, for years 1936-39, inclusive, and the current production program; the reasons why an increase, if any, above present commitments by the steel industry, is essential to the carrying out of the proposed program; evidence that the proposed program meets the declaration of purposes expressed in Section 1 of Public Law 395.

If it is recommended by the Steel Advisory Committee that the steel producing industry participate in the proposed program, the Secretary will forward it to the Director of the Iron and Steel Division of the OIC for review with the Steel Products Advisory Committee (composed of representatives of the steel producing industry) as to the available supplies of the various items of steel products needed under the program.

Subject to conclusions reached upon such review, the program will

to Page 42 →

"You're next, sir, but I warn you, you'd better not have any price increases!"

2 WAYS

TO APPROACH A COLOR PROBLEM

REACH FOR THE ASPIRIN OR ASK DRAKENFELD TO HELP

REACHING for the aspirin never did solve a color problem. Maybe that's why so many porcelain enamel manufacturers turn over their "color headaches" to us year after year.

As specialists in producing colors to meet individual requirements, we welcome the opportunity of helping to solve your color problems. Once we formulate a porcelain enamel color for you, you can rest assured that each reorder will be handled with the same careful attention to details. That's one of the reasons why you can rely on Drakenfeld to product colors that "fit" your frits for porcelain enameled utensils and appliances for home, institutional and professional use, for signs, for architectural and industrial porcelain enamel.

Drakenfeld performance is backed by many years of color research and by a comprehensive knowledge of all kinds of methods of producing porcelain enamel products that require color. Let us discuss how Drakenfeld service can aid you. Write today.

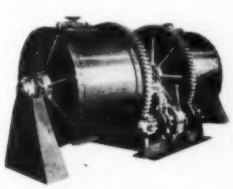
DEPENDABLE SERVICE ON: Oxide Colors . . . Screening Paste . . . Graining Colors . . . Squeegee Oils and Mediums . . . Rotospray Sifters . . . Steveco Grinding Mills . . . Porcelain Grinding Balls . . . Porcelain Mill Linings.

Rotospray — a millroom must!

The Rotospray helps you get properly prepared slip for the production line. Indispensable for "reconditioning" enamel slip. Equally valuable at ground coat dip tanks. Ideal for any job that requires speedy, positive sieving. Strains through a long-life vertical screen — no clogging. Standard and Junior sizes. Capacities range from 300 to 1,000 G.P.H., depending on nature and specific gravity of product, screen mesh and sifter size. Write for descriptive folder.

5 SAVINGS WITH STEVECO MILLS

Time
Labor
Horsepower
Floor Space
Initial Costs



Steveco high-efficiency duplex mills wet-grind porcelain enamel materials faster, better and at low cost. Many outstanding construction features proved in hard day-after-day service in many plants. Wide range of sizes and linings, with all types of drives. Write for catalog, then let us study your grinding needs and recommend the correct type for your requirements.

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→ *from Page 40*

be submitted to the "task force" (to be composed of representatives of the steel producing industry appointed by the Secretary of Commerce.) It shall be the function of the task force to submit recommendations to the Secretary as to equitable allocation of tonnage, by products, among steel producers.

Any such voluntary agreement shall include provision to the effect that steel consuming interests to which steel is made available under the agreement shall undertake that such steel shall not be used by them for any purpose other than that specified in the agreement.

The Department of Commerce will attempt to obtain the agreement of all producers of steel and steel products to participate in any such agreement in their proportionate shares as determined in accordance with the provisions of such agreement.

Chicago enamelers hold joint meeting with ACS Section

(Continued from Page 33)

coated and uncoated low carbon steel plates heated at a constant temperature for extended periods of time was found to be a satisfactory method of evaluating coatings applied to this metal. For metals which did not oxidize readily, the weight increase determined by this method fell within the limits of error of the test and the results were erratic.

"Hot and cold tensile tests were made on coated and uncoated specimens of Type 1020 low carbon steel and Type 347 stainless steel. The tensile specimens used met the requirements of the ASTM specification No. E8-36. The low carbon steel specimens were subjected to extended heating at 1700° F. Coated and uncoated tensile specimens were withdrawn periodically and broken in a 'Dillon Model K Tensile' tester at room temperature. The stainless steel specimens were subjected to extended heating at 2000° F. for various time intervals. Tensile tests on these specimens were made both at room temperature and at 2000° F.

"From the results of this investigation it was concluded:

1. The application of a ceramic coating has no detrimental effect on the strength of the specimen.
2. The coating significantly prolonged the strength of metal specimens subjected to elevated temperatures.
3. Preliminary hot breaking tests indicate that the strength of the specimen is quite sensitive to slight temperature variations.
4. The tensile test can be used as a quantitative method of coating evaluation."

The Lustron House

The joint session program was concluded with a talk by E. E. Howe, manager of the enamel division, Lustron Corporation. The title of Howe's subject was "Lustron and the Porcelain Enamel Industry."

After briefing the history of one of the industry's newest organizations, the speaker presented a number of features of the porcelain enamel house which his firm is planning to produce at a rate of 100 per day at its plant in Columbus, Ohio.

Some of the selling points of the house, as emphasized by Howe, include a wide selection in color and color combination and resistance to corrosion, fire, termites and earthquakes. All exterior and interior wall surfaces will be of porcelain enameled 20 gauge (automobile stock) steel, with the exterior wall to be acid-resistant.

In regard to production facilities, the speaker stated that equipment will include 11 large sized (up to 27,000 lbs. per hour) furnaces, 17 automatic sprays, and large double tunnel spray picklers. Plant floor space Howe said will total 300,000 square feet.

Each house will have 7,000 square feet of porcelain enameled panel of such diversified shapes as 2′ x 2′, 4′ x 4′, and 2′ x 8′. The Lustron house will have one and two-fire porcelain enamel finishes. The economy of the one-fire finish for interior surfaces was mentioned as making the product highly competitive to paint.

Howe indicated that success of the project will depend partly upon the cooperation and research of the industry which, he said, is "woefully weak" in standard tests and methods. The project will call for further development of frits and processing methods, said the speaker at the close of his address.

Porcelain enameled murals incorporated in theatre restaurant front

(Continued from Page 28)

The pictorial murals were designed as a unit, and were fired individually about eight successive times. Winter included in the design liquid gold fired into the enamel to give quality of surface to the artistic work. Particles of frit also were used to give a textural surface.

The three murals consist of 42 panels which, together, contain more than 100 square feet of enameled decoration on 16 gauge (flanged) steel. Two of the works are 8′ x 5½′, the third is 6′ x 5½′.

In the execution of the murals, Winter used about twenty values of colors which compliment the grey-glazed terra-cotta portion of the building front and the stainless steel on the door frame and marquee.

The theme of the murals is the red, black and white motif which is typical of the peasant art and life of the Austrian country. Surrounding the figures are striking, colorful, yellow-green and blue-green leaf and berry designs, while the jackets and parts of the background give interesting accents, with chinese reds and blacks used for relief to the eye.

This installation is an outstanding example of how porcelain enameled murals can be incorporated in a building front to produce an exterior with permanently colorful decorations.

• Cowles KW is a fast, efficient and economical cleaner for cleaning steel, die castings, polished and unpolished brass, copper and bronze. It may be used in still tanks with or without electric current and also in all types of washing machine equipment. Cowles KW does not attack the metal.

Adaptable with Cowles KW Cleaner are Cowles emulsion type cleaners, SOAKLEEN and LIXOL. These combinations are excellent for pre-soak cleaning and ideal for preparing steel for enameling.

Immediate shipment from warehouse stocks.

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...OUR REFERENCE SAMPLE SYSTEM: your ASSURANCE of

consistent quality • accurate color

One of the most important features of Vitro's recent expansion has been the establishment of an extremely efficient color standardization system. The basis of this system is the reference sample file. From every color shipment made by Vitro, actual samples are kept for at least two years, after which pertinent data is made a part of our complete, permanent file.

In addition to an improved reference sample system and new laboratories (part of which are illustrated above), the overall capacity of the Vitro plant has been increased about 30%. This has been possible by additional floor space and the installation of many larger units, such as frit furnaces, calcining furnaces, grinding mills, and more efficient driers.

Vitro's facilities for the production of perfected ceramic colors are at your service. Why not consult us on your next coloring problem?

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NEWS

Carnegie-Illinois appointments

Carnegie-Illinois Steel Corporation has announced the appointments of two district engineers, Edwin L. Tindall, for the Pittsburgh district, and Sigurd Landen, for the Chicago district.

Both Tindall and Landen will be located in Pittsburgh, Pa., general offices of the company.

Jay M. Powers has been named assistant director of purchases for Geuder, Paeschke & Frey Co., according to an announcement by N. Martin Steffens, director of purchases. Powers has been with the Milwaukee firm for six and one-half years.

IBRM and U. of I. to sponsor course on heating systems

A three-day course for the study of hot water and steam heating systems will be held at the University of Illinois, Urbana-Champaign, June 15-17, under the sponsorship of the University of Illinois and The Institute of Boiler and Radiator Manufacturers.

Instruction will be similar, to a large extent, to that given in the first short course on heating systems held at Navy Pier, Chicago, last September, it was announced. Some of the instructional material will be based on the Institute's research program at the University.

Requests for information on elementary and advanced courses should be addressed to H. C. Rountree, assistant director, Division University Extension, Room 118A, Illini Hall, University of Illinois, Champaign.

Mullins advances Bohm

finishfoto

Daniel Bohm has been named general superintendent of the Salem, Ohio, plants of Mullins Manufacturing Corp., according to an announcement by Frank M. Beauregard, vice president in charge of operations. A member of the Mullins organization since 1911, Bohm has been superintendent of Plant One at Salem since 1937.

1948 AGA convention plans

As a feature of the 1948 Convention of the American Gas Association, to be held in Atlantic City the week of October 4, the Gas Appliance Manufacturers Association will stage the largest and most comprehensive exhibit of gas appliances and equipment ever assembled under one roof, according to Major T. J. Strickler, chairman of the general convention committee, and vice president of The Gas Service Company, Kansas City.

It was announced that the Technical Section will hold its meetings and headquarters at the Ambassador Hotel, the Residential Gas Section and the Industrial Gas Section at the Ritz-Carlton Hotel, and the Accounting Section at Haddon Hall.

Tappan Stove promotions

Tappan Stove Company, Mansfield, Ohio, has announced the promotion and transfer of three men to its subsidiary Murray Manufacturing Co. plant, Murray, Ky.

They are: Verne O. Kyle, new assistant general manager of the Murray plant; Arlo H. Sprunger, chief production engineer; and John S. Pocock, purchasing agent. General manager of the Murray plant is R. M. Lamb, former Tappan plant superintendent in Mansfield.

Appointment of Merle J. Graham as manager of the West Leechburg, Pa., plant of Allegheny Ludlum Steel Corporation was announced by M. C. Harris, vice president in charge of production. Appointment of Frank G. Benford as assistant plant manager also was announced.

Packaging week to stress producer-consumer protection

Selection of the slogan "Proper Packaging Protects the Product and the Purchaser" as the theme for Packaging Week, April 26-30, was announced by the American Management Association, sponsor of the event.

During that week the $7,500,000,000 packaging industry will emphasize the economic advantages of improved packaging, packing and shipping to manufacturers, distributors and consumers. The national observance will coincide with AMA's 17th

annual packaging exposition and conference to be held in Cleveland, Ohio.

More than 250 trade associations representing industries using packaging, more than 35 trade groups representing suppliers to the packaging industry, and 200 leading producers of packaging equipment are being asked to participate in the effort by stressing packaging in their regular advertising and publicity and by sponsoring special events, it was stated in the announcement made by Henry J. Howlett, AMA secretary.

Harshaw Chemical dedicates new library

The formal opening of new quarters of the intelligence service division of Harshaw Chemical Company, Cleveland, Ohio, was celebrated February 17 with members of the Special Libraries Association as guests. W. C. Hovey, vice president in charge of research and development, spoke on behalf of the company, welcoming the guests.

Following a symposium on "Punch Cards in Library Science," the guests were given an opportunity to inspect the library which occupies 3500 square feet of floor space in a new building connecting both office building and laboratories. The library houses over 6000 books and bound journals comprising 115 sets.

Harshaw's intelligence service division publishes and distributes a bimonthly 20-page bulletin which carries abstracts of articles and news items of interest to company personnel. The division staff consists of Dr. Catherine Cassidy, chief of the division; Jean Almas, B.A., assistant librarian; Wilfred Hoffman, B.S.; and three clerical assistants.

Canadian Ceramic Society 46th annual meeting

More than 300 persons attended the 46th annual meeting of the Canadian Ceramic Society held in February at the General Brock Hotel, Niagara Falls, Ontario.

A joint meeting with the Upstate New York Section of the American Ceramic Society was featured by an address by Prof. John F. McMahon, New York State College, Alfred, N. Y. Professor McMahon presented a paper on "Analysis of Ceramic Research."

The new president of the Canadian Society for the coming year is James W. Craig, Canadian Refractories Limited, Montreal. P. H. Swalm, Frontenac Floor and Wall Tile Co. Ltd., Kingston, is the new vice president. Howells Frechette, Ottawa, continues as secretary.

The new slate of officers for the Enamel Division includes the following:

Chairman: W. S. Craig, Stamped & Enamelled Ware Ltd., Hispeler, Ontario.

Secretary: T. W. Fenton, General Steel Wares Ltd., London, Ontario.

Directors: J. M. Henderson, American Rolling Mills, Montreal; M. P. Durrant, Frigidaire Corporation, Leaside, Ontario.

R. F. McAllister, Ferro Enamels, Oakville, Ontario, has charge of programme details.

Reports from both the University of Toronto and Saskatchewan showed the largest enrollment the institutions have had in ceramic courses.

The 1949 meeting of the Society will be held in February at the Royal Connaught Hotel, Hamilton, Ontario.

AGA to exhibit at foundry show

The Industrial and Commercial Gas Section of the American Gas Association will sponsor an exhibit at the 52nd annual convention and foundry show of the American Foundrymen's Association, which will be held May 3-7 in Convention Hall, Philadelphia.

The board of directors of Pennsylvania Salt Manufacturing Company has elected Y. F. Hardcastle, vice president in charge of manufacturing, as a board member, it was announced by Leonard T. Beale, president.

U. S. Steel Supply purchases warehouse in San Francisco

United States Steel Supply Co., which maintains headquarters in Chicago, has purchased the warehouse and facilities at 1940 Harrison St., San Francisco, Calif., from Columbia Steel Co., L. B. Worthington, president of the purchasing company, has announced. Both U. S. Steel Supply and Columbia Steel are subsidiaries of United States Steel Corp.

The purchase of the block-long warehouse in San Francisco is the first move by U. S. Steel Supply to effectively serve steel users in San

Francisco and northern California, said Worthington.

Eljer steps up advertising

In addition to advertising in consumer and trade publications, Eljer Co., of Ford City, Pa., is running a series of four-color full-page advertisements in the Saturday Evening Post.

The advertisements announce that the company has been making porcelain enameled plumbing fixtures for nearly half a century, with the present line of products including bathroom, kitchen and laundry fixtures.

The firm had its origin in 1904 at Oakland, Calif., in a machine shop over a barn, to manufacture brass specialties. Raymond Elmer Crane, president, and his cousin, Oscar Jerome Backus, formed a partnership, and coined the name "Eljer" from their middle names.

In 1907, a plant in Cameron, W. V., was purchased, and the young firm began manufacturing vitreous china ware. Present plants are located in Salem, Ohio, Los Angeles, Calif., and Ford City.

Walker resigns at Roberts & Mander

E. D. (Ike) Walker, plant manager of Roberts & Mander Corporation, Hatboro, Pa., for the past four years, announced his resignation from that organization recently. Prior to his association with Roberts & Mander, Walker was for ten years in the production division of Goodyear Tire & Rubber Co., and later procurement manager of Goodyear Aircraft Corporation, Akron, Ohio.

Helen Kendall advises home builders

Addressing a clinic during National Association of Home Builders convention in Chicago, February 24-25, Mrs. Helen W. Kendall, Good Housekeeping Institute, Good Housekeeping Magazine, advised builders to make provision in new homes for laundering facilities which are "definitely first in women's minds."

The clinic included, left to right in photo, Mrs. Kendall; Grant Layng, sales manager, builder division, Bendix Home Appliances, Inc., as moderator; Dave Hays, AWIMA engineering consultant, and J. A. Amerman, vice president, Prudential Life Insurance Co., Newark, N. J.

American women expressed their desire for home laundering facilities in their homes to the extent of buying almost 4,000,000 washers in 1947, declared Hays at the household laundry planning clinic.

Instrument show booths reported two-thirds sold

More than 65 per cent of the exhibit space for the Third National Instrument Conference and Exhibit, to be held in Convention Hall, Philadelphia, September 13-17, has already been allocated, it was announced by the allocation committee of the Instrument Society of America.

New Vitro executive

Henry C. Greene has been elected treasurer and assistant secretary of Vitro Manufacturing Co., Pittsburgh, Pa., according to an announcement by A. J. Strod, president.

Greene is also assistant to the president of Rockwell Manufacturing Co., also of Pittsburgh, said Strod.

Harbison-Walker appointments

Harbison-Walker Refractories Co., Pittsburgh, Pa., has announced the election of H. S. Robertson as vice president, and the appointment of F. W. Sheppard as general sales manager, and C. A. Brashares as sales manager of the Birmingham district.

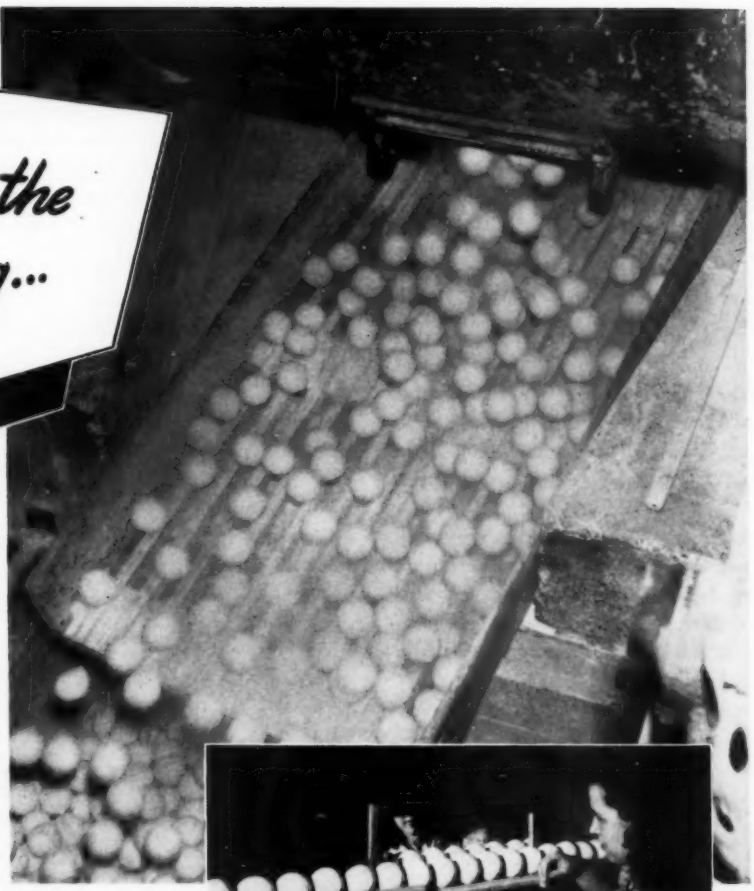
Robertson was appointed general sales manager in 1940, and since 1943 has been a director of the company.

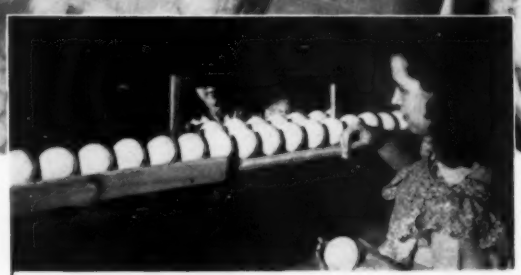
Marketing consulting service for PEI members

The Porcelain Enamel Institute Market Development Committee has announced, through its chairman, R. A. Dadisman, that individual marketing consulting service will be offered to Institute members.

The chairman, or a designated member of the committee, will meet with members requesting this service,

Proof of the Pudding...





BEFORE SHIPMENT EVERY McDANEL GRINDING BALL IS MILL TESTED

They have to be good!

Every effort is made to make McDanel Grinding Balls outstanding — in quality — performance — and durability.

Proof of how well these Balls will stand up in service is demonstrated by the test run every McDanel Ball must make in an uncushioned mill over a period of time. All balls that are defective are discarded when the mill is discharged. The others pass on for final inspection where imperfections are easily discovered before shipment. Thus, McDanel Grinding Balls warrent your complete confidence in grinding operations. They will outperform all others in faster grinding, longer service and true economy.

McDanel
Refractory Porcelain Co.
Beaver Falls . . . Penna.

*** HAND ROLLED GRINDING BALLS**

Made from specially developed vitreous porcelain body and hand rolled for faster, uniform grinding. Mill tested and individually inspected before shipment to you.

*** MILL LINING BRICK**

Low in glass content, McDanel Mill Lining Brick gives maximum resistance to wear and long, satisfactory service. Complete size range to fit every size mill.

*** MILL HEAD ASSEMBLIES**

Be sure to specify McDanel Mill Head Assemblies on your new mills. No metal can contaminate your mill charge with these patented covers. They are tops for uniformity of batch and long service.

*** METAL COVERED GRINDING JARS AND MILLS**

Protected with heavy gage steel jacket McDanel Metal Covered Grinding Jars and Mills are easy to handle, easy to clean, discharge rapidly and stand up under long usage.

Chicago Vitreous Enamel Product Co.
CICERO, ILL.
Exclusive representative for the Enamel Industry

to advise on present promotional methods and to suggest methods that have proved successful with other organizations.

Advertising, sales promotion, sales training, etc., will be stressed in these discussions. At the same time, the general market development program of the Institute will be explained in detail so that members may take full advantage of it, if they desire, and coordinate it with their own plans.

With every evidence that the predicted era of keen competition is rapidly approaching, PEI suggests that now is the time for every company to give consideration to promotional policies that will protect and expand its markets. This new market development service, says PEI, is an opportunity for members to secure, without cost, expert marketing advice and specific help in developing a promotional program that will meet the needs of their business.

Oil stove manufacturer to make gas appliances

This "Million Dollar Engineering Research Center," which houses engineering and development work, is also part of Perfection Stove's expansion program.

Perfection Stove Company, Cleveland, Ohio, celebrated its 60th anniversary by announcing that it will manufacture gas appliances as well as those using oil as fuel.

A leader in the oil-burning home appliance field almost since its founding in 1888, Perfection has added natural, manufactured and LP-gas ranges and water-heaters to its oil-burning line.

The company was founded as a small foundry by Francis E. Drury and H. P. Crowell. The first items manufactured were cast iron frames for school desks, hot air registers and sad irons. Oil-burning home heating equipment was added in 1894, water heaters in 1912, and the "Superfex" line of furnaces in 1932.

The present Perfection line includes oil and gas furnaces, both domestic and industrial, oil-burning ranges and cook stoves, oil water heaters, oil-burning home heaters and the "Superfex Engine Heater."

The Platt and Ivanhoe plants provide almost a million cu. ft. of working space. An expansion program now underway at the Ivanhoe plant will increase the company's floor space by almost 50 per cent. A division described as a "Million Dollar Engineering Research Center," housing all of the engineering and development work, was completed a year ago.

L. S. Chadwick has been president of Perfection Stove Company since 1922.

Store modernization show advisory committee

Representatives of 15 retail associations, 3 retailing groups, and 3 associations directly involved in store modernization comprise the advisory committee sponsoring the 2nd International Store Modernization Show, to be held July 6-10 at Grand Central Palace, New York City, it was announced by John W. H. Evans, managing director.

O. B. Wilson has been named industrial manager for the eastern sales region of Brown Instrument Co., it was announced by L. M. Morley, vice president of the Minneapolis-Honeywell organization and its Brown division.

Wilson's promotion, said Morley, will make him regional manager of the territory extending from northern Virginia, through eastern Pennsylvania, to the Canadian border, west to Rochester, N. Y., and in New England.

Rutgers ceramic club meeting

At the regular monthly meeting of the Rutgers Ceramic Club, held February 11, Raymond E. Birch, director of research, Harbison-Walker Refractories Co., discussed "The Industrial Revolution in Ceramics."

Announce ceramic engineering fellowships at N. Carolina State

Two fellowships for graduate study in ceramic engineering have been announced by Dr. J. H. Lampe, Dean of the School of Engineering, North Carolina State College, Raleigh, N.C. The fellowships are known as the Edward Orton, Jr. Ceramic Foundation Fellowship and the American Refractories Institute Fellowship.

Another fellowship is being established at the college in honor of Dr. Greaves-Walker and to foster research

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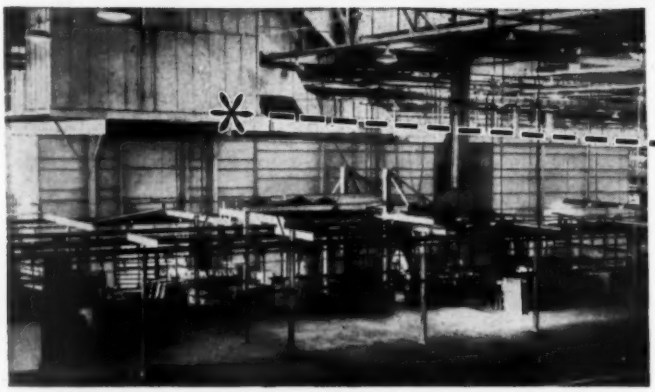
ANOTHER * DEVILBISS

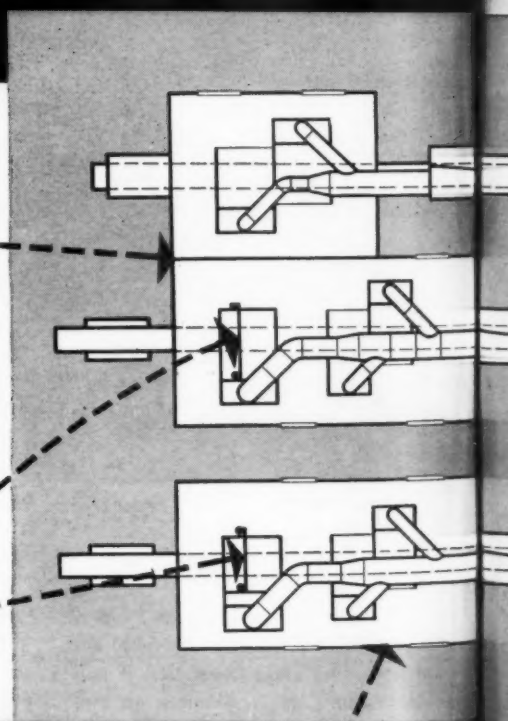
Complete

PORCELAIN ENAMELING SYSTEM



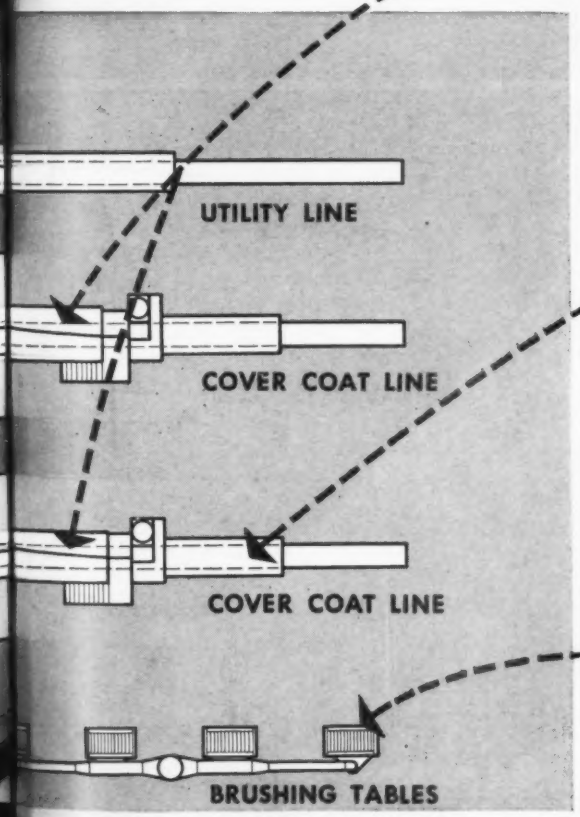
Air replacement unit, mounted overhead to save floor space, delivers clean filtered air to the spray rooms which are pressurized to keep the finish perfectly clean.

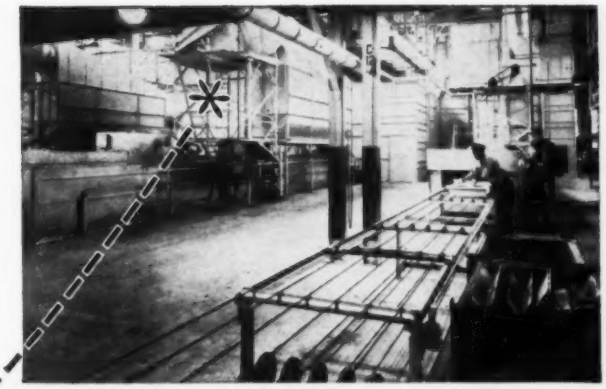
DeVilbiss automatic spray machines, each with multiple guns, apply an even, uniform coat at remarkable speed with great savings in both material and labor.



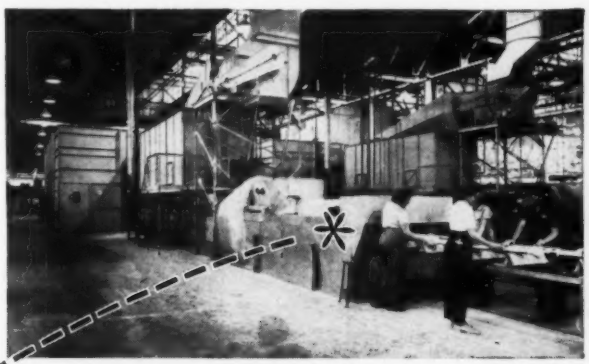
All spraying is done inside DeVilbiss pressurized rooms where dust and dirt cannot contaminate the finish. Inter-connecting exhaust ducts carry the over-sprayed material to an efficient water wash chamber where the solids are arrested.

This Consolidated Vultee plant is a typical example of DeVilbiss-Engineered and DeVilbiss-Coordinated complete enameling departments. The diagram and illustrations portray the space saving arrangement of efficient enameling equipment which is turning out quality stove components in vast quantities, at low cost, and with a very high degree of uniformity.

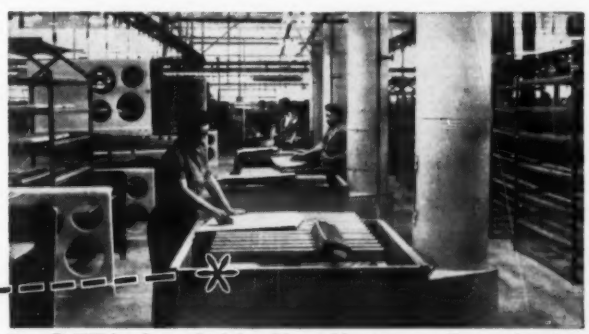




Two elevated DeVilbiss water wash exhaust chambers shown at the upper left, draw from the spray booths and wash the air before discharging it to the outside. Approximately 99% of over-sprayed materials are recovered in these systems.



Cable conveyors carry parts from the loading stations at the start of the enameling lines through all spray operations including the dryers shown above.



Four DeVilbiss down draft brushing tables remove all annoying dust and loose material caused by the brushing operation. Health hazards are eliminated and working conditions are greatly improved.

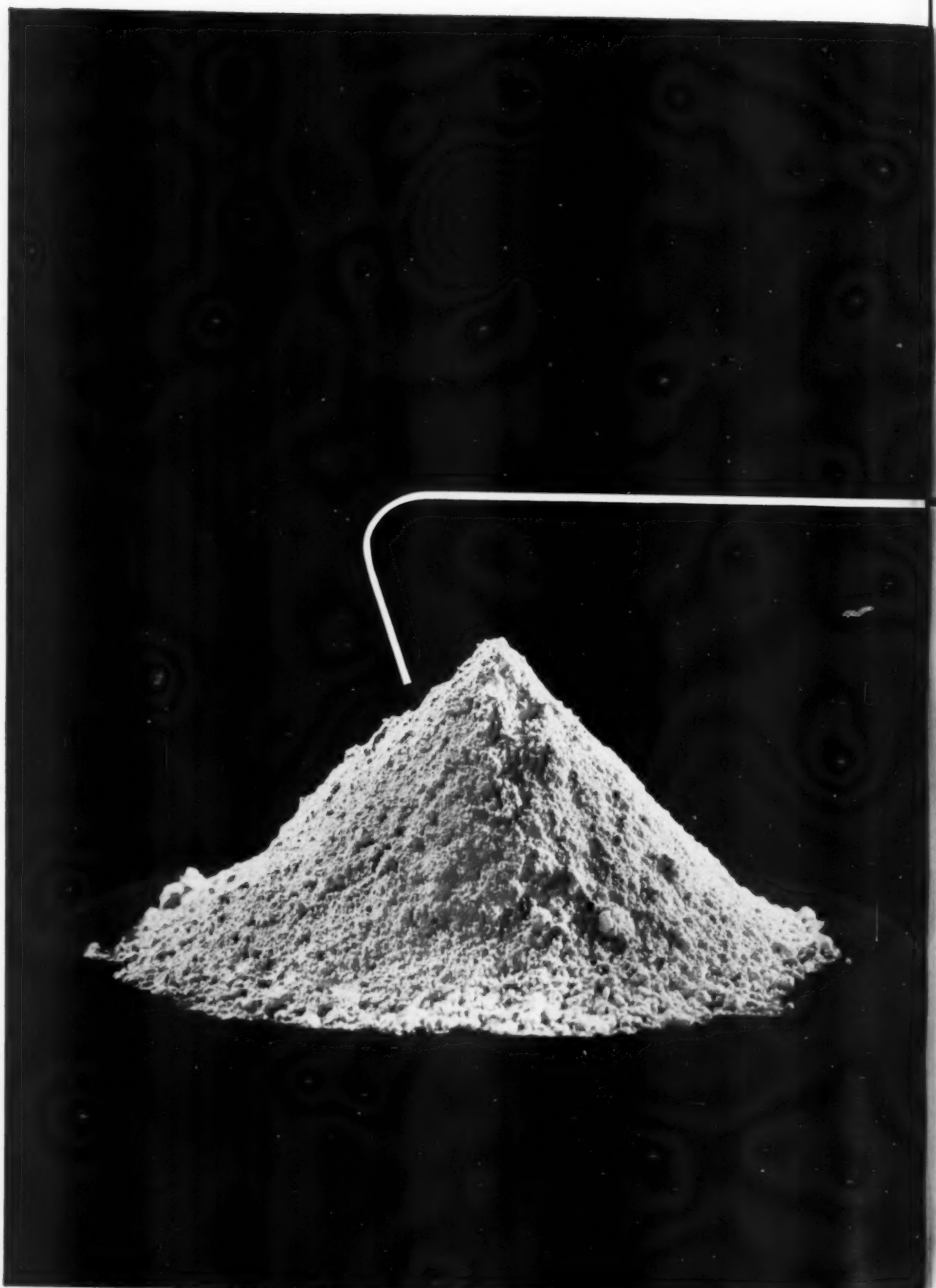
Have your enameling department analyzed by a DeVilbiss engineer. There is no obligation, and more than likely he can show you short cuts to finer quality, greater production and lower costs.

THE DeVILBISS COMPANY • Toledo 1, Ohio
Canadian Plant: WINDSOR, ONTARIO

DE VILBISS

means **Quality** *in all four . .*

SPRAY EQUIPMENT
EXHAUST SYSTEMS
AIR COMPRESSORS
HOSE & CONNECTIONS



Ferro

SUPER CLAYS

from the world's most modern plant

Again, Ferro leads the way—in the development and production of Porcelain enameling clays!

In a new plant at Nashville, Tenn., Ferro has installed the most modern processing equipment . . . put into effect elaborate Quality Controls—for the production of Ferro Blend Clays. With these innovations and without changing basic formulas, Ferro Black Label, Red Label, Blue Label and Green Label Clays are now cleaner, of better color and more uniform than ever before.

If you are not using these finer clays, we suggest you give them a trial. Or, ask your Ferro Representative for further details.

FERRO

ENAMEL CORPORATION

4150 East 56th Street • Cleveland 5, Ohio

→ *from Page 49*

in ceramic engineering. It is unlikely, however, that the fund will be sufficient for this fellowship to be offered this year, according to Dr. W. W. Kriegel, Head of the Department of Ceramic Engineering.

Paul Kates to Industrial Enameling

Industrial Enameling, Inc., New Orleans, La., has announced the appointment of Paul Kates as factory superintendent in charge of production.

The increasing demand for architectural porcelain, signs, and other products necessitated this expansion in the Industrial Enameling organization, according to Ben F. Birdwell, general manager of the firm.

A graduate ceramic engineer, Kates spent many years as technical service engineer for Ferro Enamel Corp. He also managed production in other enameling plants.

Myers heads market development for Carnegie-Illinois

Appointment of Robert C. Myers as manager of the market development division of Carnegie-Illinois Steel Corporation has been announced by Thomas J. Hilliard, vice president in charge of sales.

Myers succeeds R. J. Ritchey, recently appointed director of the new market development division of United States Steel Corporation of Delaware.

A graduate of the University of Pittsburgh, Myers joined Carnegie-Illinois in 1939 as a development engineer in sales promotion.

Public tours at Merchandise Mart

A system of guided tours through The Merchandise Mart, Chicago, was inaugurated in March, according to an announcement by Joseph P. Kennedy, owner.

The first such regularly scheduled tours will take an hour to complete. It was announced, however, that no public tours will be conducted through the Mart during the January and July markets.

Tribute to Ing-Rich founders

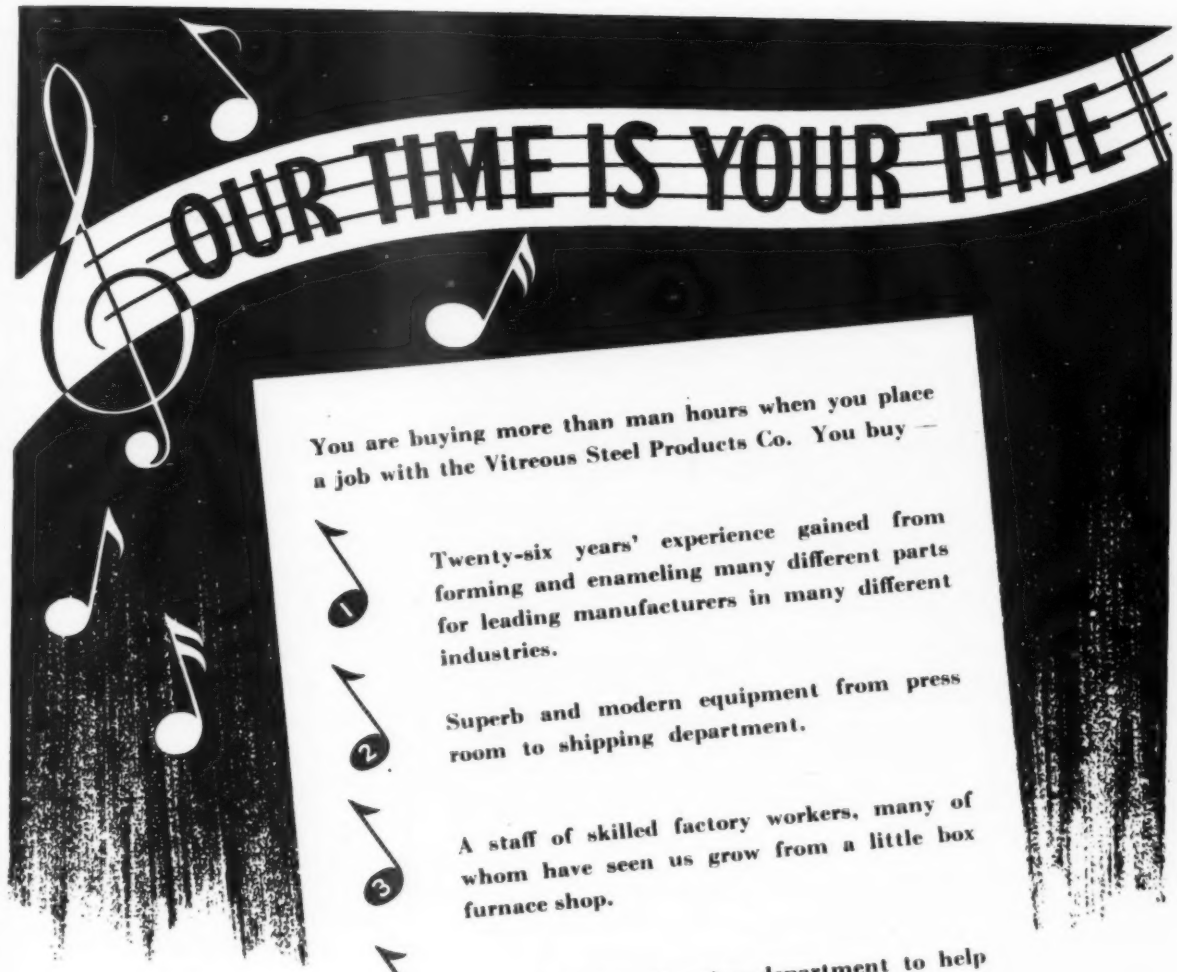
Ernest Richardson is shown with the bronze plaque presented to him by the Segal-Empire group of the furniture industry for his efforts together with those of the late Louis Ingram, in the introduction and development of porcelain table tops. The presentation was made at a testimonial dinner in New York City on the occasion of Richardson's retirement as president of Ingram-Richardson Manufacturing Co.

The organization of six divisions in the small and medium motor divisions of General Electric Company was announced by W. H. Henry, manager of the divisions which constitute one of the new businesses formed by the apparatus department of G-E.

Grierson and Sliter to Trubey interests

Two executives of Clyde Porcelain Steel Corp., Clyde, Ohio, have resigned their positions to accept important posts with R. R. Trubey, former president of the Clyde concern, according to a recent report.

A. R. (Andy) Grierson, who served as vice president in charge of manufacturing since last June, is now a director and vice president in charge of manufacturing for both Artkraft Mfg. Corp., Lima, Ohio, and Americana Furniture, Inc., with plants in Little Rock, Ark., and Kernersville, N. C. He now resides in Lima. Trubey founded both companies and is chairman of the board of Artcraft and president of Americana. Prior to being named vice president, Grierson was assistant to



You are buying more than man hours when you place a job with the Vitreous Steel Products Co. You buy —

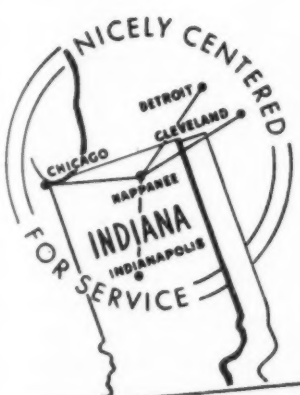
1. Twenty-six years' experience gained from forming and enameling many different parts for leading manufacturers in many different industries.

2. Superb and modern equipment from press room to shipping department.

3. A staff of skilled factory workers, many of whom have seen us grow from a little box furnace shop.

4. An art and engineering department to help create designs for low cost production and for high eye appeal.

Most important, this work goes into a shop which *must* have it. We run a job enameling plant. We make no finished products. We are out of business if we don't please our manufacturing customers.



VITREOUS STEEL PRODUCTS CO.

BOX 1791, CLEVELAND 5, OHIO (Factory at Nappanee, Ind.)

Trubey when the latter was president of Clyde.

Gordon Sliter, who joined Clyde Porcelain Steel in September, 1944, as purchasing agent, later was made office manager, and, last August, was promoted to production manager, has also accepted a managerial position with Americana Furniture, Inc. He will live in Little Rock.

Rutgers students visit ceramic plants

A group of 40 ceramic students from Rutgers University recently spent two days visiting ceramic plants in the Baltimore area. The trip was part of the required inspection trips and supplemented plant visits made in the local area.

Plants visited included: Pemco Corporation, Baltimore Porcelain Steel Corp., Locke Insulator Corp., and Harbison-Walker Refractories Co. The students greatly enjoyed the opportunity to observe the processes and equipment at these plants, according to their report.

Accompanying the students were Dr. John J. Koenig, Laurence R. Blair, and Clarence A. Lambelet, all staff members at Rutgers.

Joe Johnson to Multi-Electrical

News comes to *finish* that Joe Johnson is now with the enameling division of Multi-Electrical Mfg. Co., Chicago, Ill.

Johnson has been in ship building during and since the war, but is an "old time" enameler. Before the war he was with Great Western Stove Works, Leavenworth, Kansas, and before that he was with Chicago Vitreous Enamel Product Co., in the service department.

ACS Northern Ohio section to visit G-E lighting institute

The next meeting of the Northern Ohio Section of the American Ceramic Society, to be held Monday, April 12, Nela Park, East Cleveland, will be featured by an evening trip through the General Electric Lighting Institute, it has been announced.

Displays will be shown featuring modern lighting in the various rooms of the home as well as commercial lighting, such as department stores and schools. There will also be a talk on new types of research in lighting and the progress being made. Members are urged to bring their wives and older children.

Second Tribune "Better Rooms" competition

A second nation-wide $26,250 "Better Rooms" competition has been launched by the Chicago Tribune as the newest phase of a long-range program designed to stimulate public interest in appliances, home furnishings and decorations.

The Tribune again is offering 161 cash awards ranging from $100 to $1,000 each for fresh and interesting ideas for furnishing and decorating seven typical rooms.

After the close of the competition on June 7, the successful "Better Rooms" entries will provide the foundation for a comprehensive merchandising assistance program in line with the objectives of furniture and appliance manufacturers and retailers.

For information, write "Better Rooms" Competition, Chicago Tribune, Room 2319, Chicago 11, Illinois.

New officers of Trenton ACS section

The new officers of the Trenton Section of the American Ceramic Society have been announced as follows: H. B. DuBois, councillor; H. S. Magid, chairman; J. C. Elder, vice chairman; Roland Tucker, secretary and treasurer.

The Section's next meetings are scheduled for April 2 and May 21.

AWIMA display space at Edison Electric Institute

The American Washer and Ironer Manufacturers' Association will have display space at the 14th annual sales conference of the Edison Electric Institute at the Edgewater Beach Hotel, Chicago, April 6-8.

Howard Wolf advanced by Mullins

Howard C. Wolf has been named to succeed Richard F. White who has retired as assistant to the president of Mullins Manufacturing Corporation, according to George E. Whitlock, president.

Wolf has been doing special prod-

uct and market survey work for Mullins during the past two years. He has been associated with Mullins and the Youngstown Pressed Steel Co., which became a part of Mullins in 1937, for 20 years. During World War II, he served four years in the Army Ordnance, and received an army commendation for his work in redesigning cast and forged ordnance parts to mass produced stampings. *(See "The Effect of War Production on Metal Stamping Technique," May, 1945* finish.*)*

White has been with Mullins for 26 years, serving as works manager and a vice president in Salem before his appointment as assistant to the president in 1937. In 1929 he was elected to the board of directors, a position he still holds. He will continue to serve as consultant to the corporation from his office in Washington, D. C.

Scarlett to Seeger post

Jack Scarlett has joined Seeger Refrigerator Co., Evansville, Ind., as superintendent of production engineering, it has been reported. He previously had been with Frigidaire Corporation, Dayton, Ohio.

The board of directors of Philco Corporation, Philadelphia, announced that the regular quarterly dividend on the company's common stock has been increased to 50¢ per share payable as of March 12 to stockholders of record March 1. The board also declared the regular quarterly dividend of 93¾¢ per share on preferred stock, 3¾% Series A, payable April 1 to holders of record March 15.

Furniture Mart officers and directors

All officers and directors of the American Furniture Mart Building Co., Inc. were reelected in February at the annual meeting of stockholders and the meeting of the board of directors.

Members of the board, including some of the officers, are as follows: R. K. Cartlidge; Aaron Colnon; H. J. Klossner; D. L. Kroehler; H. T. Mathers; G. C. Rasmussen, secretary and treasurer; G. M. Robinson, vice president; F. S. Whiting, vice president; and L. H. Whiting, president. J. C. Brown also was reelected as assistant secretary and treasurer.

Changes in Norge field staff

The Norge division of Borg-Warner Corporation has realigned and added to its field staff, according to H. L. Clary, general sales manager.

C. H. Alden, formerly west coast district representative, now is the midwest regional manager with headquarters in Chicago. He will be assisted by Russell F. Cates and Charles Marvin, district representatives.

J. W. Webster, who was acting regional manager in Chicago, has been made central regional manager and will move his headquarters to Detroit. He will be assisted by W. C. Gordon.

Anderson Stove acquires new plant

Photo shows newly acquired plant of 200,000 square feet to be operated with three-quarters of a million dollars' worth of new equipment to produce gas ranges in greatly increased quantity by Anderson Stove Company, Anderson, Indiana.

John T. Mascuch, president of Breeze Corporations, Inc., Newark, N. J., of which Anderson Stove is a subsidiary, stated that, with the new gas range manufacturing plant four times larger than present facilities in Anderson, production will be quadrupled. Employment is expected to rise correspondingly. New equipment will help produce ranges on an automatic handling, assembly line basis.

Lustron appointment

Appointment of Antonio Montagno as plant engineer for Lustron Corporation, Columbus, Ohio, was announced by Carl G. Strandlund, president.

A graduate in mechanical engineering from Brooklyn Polytechnic Institute, Montagno designed and constructed the enameling plant of Fleetwood Airflow Corp., Wilkes Barre, Pa., it was stated in the announcement.

Following graduation from engineering school, he was plant superintendent for 13 years at Welbilt Stove Co. of New York. At one time he also was a consulting engineer for Boston Stove Foundry Co., Reading, Mass.

Directors have voted the regular $1.50 dividend on the 6 per cent preferred of Conlon-Moore Corporation, payable April 15 to stockholders of record March 31, it has been announced.

Pennsalt names Chicago district heavy chemicals representative

Hugh R. Bishop has been named Chicago territory sales representative for Pennsylvania Salt Manufacturing Company's heavy chemical division, replacing C. Harvey Ander-

son, it was announced by R. S. Roeller, field sales manager. Anderson was transferred to the Wisconsin and Minnesota territory.

Rahr Color appointment

Miss Vera V. Shatford has joined the staff of Rahr Color Clinic, 9 East 56th Street, New York City, according to Frederic H. Rahr, president of the color consulting firm. Miss Shatford will work in a consultant capacity with manufacturing and retail store clients of the clinic in coordinating color count activities, it was stated.

Fowler features porcelain enameled water heater

Paul Fowler, president, Fowler Mfg. Co., appraises a 55-gallon tabletop water heater.

A new tabletop type electric water heater with a 55-gallon capacity has been announced by Fowler Manufacturing Co., Portland, Oregon.

Finished in porcelain enamel, the water heater was designed for use in large kitchens, basement or laundry rooms. The new model has two tanks connected in series in its interior and features a separate automatic temperature control for each tank. The tanks are porcelain-lined.

New enrollment at Rutgers

With the beginning of the new school term in February, the undergraduate registration at the School of Ceramics, Rutgers University, totaled 114 students. Enrolled are 26 freshmen, 25 sophomores, 38 juniors, and 25 seniors.

Also, supplementing their previous four-year undergraduate training at other institutions with a special one-year program of ceramic courses at Rutgers are three other students.

In addition to the undergraduate enrollment, the School of Ceramics has 22 students taking graduate work.

A new arrival has been announced at the home of the Ray Gutmans—a baby girl born February 27. Gutman is a partner in the firm of Porcelain Enamel Finishers, Chicago. The Gutmans were already the parents of two boys.

Renown sales appointments

Homer L. Scott has been promoted to district manager in charge of all sales and dealer relations in New England, New York, Pennsylvania and New Jersey for the Renown Stove Company, Owosso, Michigan, according to an announcement.

The report said that C. L. Job, as district manager of the western division, will have charge in Wisconsin, Minnesota, North and South Dakota, Iowa, Nebraska and northern Illinois (except Chicago).

W. C. Schneider, of Owosso, territory manager, will handle similar responsibilities in Michigan. Philip Murnane is Renown's Chicago representative.

New purchasing agent at Florence Stove, Gardner

It has been announced by Myron E. Vaughn, director of purchases, that Ivan C. Wink has been appointed purchasing agent at the Gardner Plant of Florence Stove Company. This appointement was made to fill the vacancy caused by the resignation of E. W. Berry.

Ross Purdy honored by Pittsburgh Section of ACS

The *finish* editor had the pleasure of attending a dinner meeting of the Pittsburgh Section of the American Ceramic Society on Friday evening, March 12. The occasion was the honoring of Ross Coffin Purdy through the presentation of the Albert Victor Bleininger award.

Toastmaster for the occasion was E. W. Tillotson, past president of A.C.S.

After the address of welcome, by J. S. Nordyke, chairman of the Pittsburgh Section, four past presidents presented brief talks. Alexander Silverman gave an interesting biographical sketch of Albert Victor Bleininger, "Man and Scientist." "Ross Coffin Purdy, The Medalist," was then portrayed by F. H. Riddle, E. H.

This complete finishing system is typical of hundreds of installations made by DESPATCH engineers. Whatever your particular problem, their wide experience can help solve it quickly, efficiently and economically.

1100 REFRIGERATORS PER 8-HOUR DAY AUTOMATICALLY PROCESSED BY THIS

DESPATCH Finishing System

Production was boosted 27% by a large midwestern refrigerator manufacturer when this *automatic* DESPATCH Finishing System was installed. Designed and built to fit a *limited* floor space only 25′x450′, this system *finishes* 1100 refrigerators in 8 hours with less labor and *at 43% lower cost!*

Space was saved by installing a compact, multi-pass, gas-fired dryoff oven directly over the 6-stage Spra-Bonderite section. A thorough, 25-minute dryoff at 300-350° F. eliminates extra labor of a blow off operation. A variable-speed monorail conveyor, traveling about 18 f.p.m., carries boxes and parts thru Bonderite, up into dryoff, then down for transfer to paint conveyor.

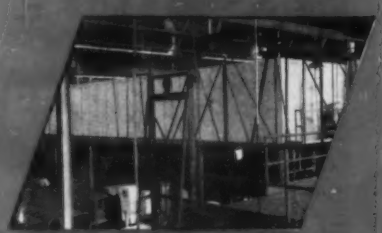
The split conveyor system permits either paint or Bonderite to operate *independently* with minimum loss of productive time. It eliminates complete shutdowns of the whole system.

Automatic spray guns are mechanically synchronized with the special floor-type (pedestal) conveyor. They paint both sides and top. Prime and finish coats are applied in seven staggered spray booths in a 107-foot-long enclosure supplied with heated and filtered make-up air. Glass windows permit observation without going inside. As the boxes emerge from the enclosure, only ONE touch-up man is required to complete the spray job.

Boxes and parts are carried up into the gas-fired, forced convection finish baking oven at approximately 12 f.p.m. by the variable-speed paint conveyor. They are baked uniformly for 47 minutes at 300-350° F. in this 4-horizontal-pass, 22′x136′ oven, then descend to floor level for unloading and assembly.

WRITE for Bulletin 51 showing Bonderizers, air make-up systems, etc.

Refrigerator boxes and parts leaving the 150-foot Spra-Bonderite section.



Boxes ascend to this compact, gas-fired dryoff oven directly above Bonderite.

Transferred to floor-type paint conveyor, the boxes enter this automatic spray room.

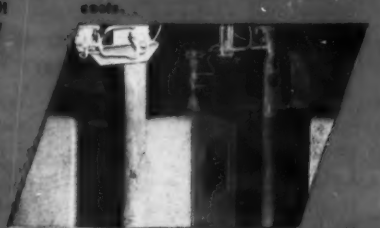
DESPATCH OVEN CO.
Minneapolis Office: 619 S.E. 8th St.
Chicago Office: 221 N. LaSalle St.
Offices in All Principal Cities.

DESPATCH OVEN COMPANY

This gas-fired, multi-pass oven bakes 1100 boxes a day. Note space saved below.

Finishing 137 refrigerators per hour with only ONE touch-up man required!

This view *inside* the spray room shows how automatic sprays save labor costs.



Fritz and J. D. Sullivan, under the subjects of "The Years of Preparation," "The Years of Organization," and "The Years of Fruition." The award presentation was made by A. P. Thompson, chairman of the Bleininger Award Committee.

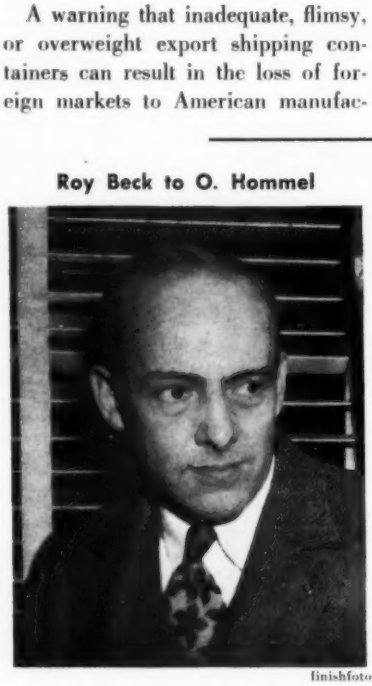
Approximately 250 were in attendance.

Watch your export packaging

Beale issued his warning after receiving a written complaint from an importer of American goods in Venezuela that merchandise shipped from this country frequently arrived there damaged. He described the letter as "an indication that American exporters, in their haste to procure foreign markets, have too frequently failed to pay proper attention to packaging." American goods, Beale warned, can lose foreign markets by either inadequate packaging that results in damages or over-heavy packaging that results in excessive tariff charges.

A warning that inadequate, flimsy, or overweight export shipping containers can result in the loss of foreign markets to American manufacturers and exporters has been sounded by L. S. Beale, secretary, Wirebound Box Manufacturers Association, Chicago.

Roy Beck to O. Hommel



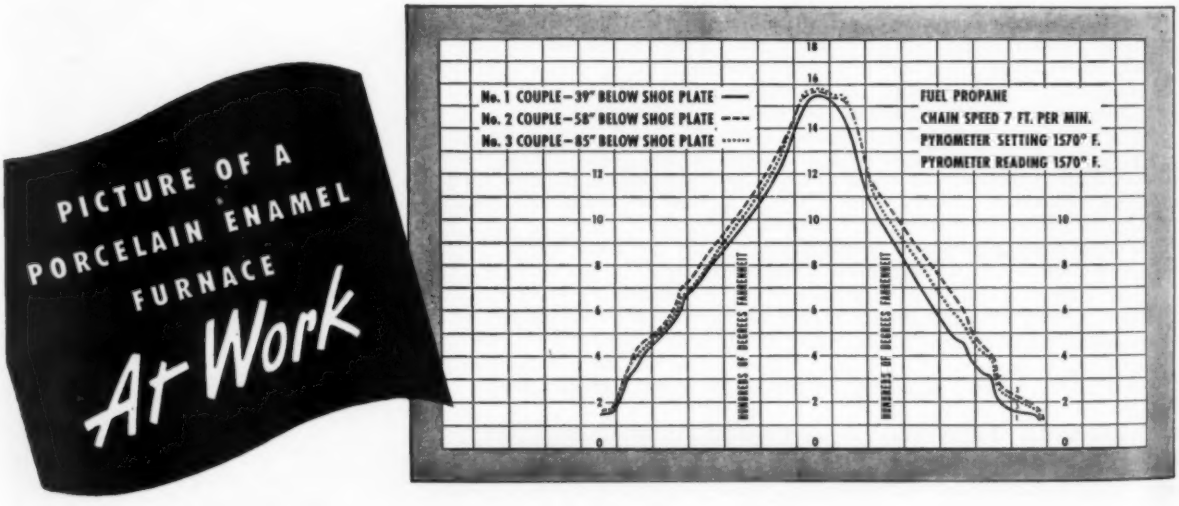
finishfoto

The announcement was made recently of the appointment of Roy D. Beck as sales engineer for The O. Hommel Co. It is indicated that his work will be in the midwest with headquarters in Chicago.

Since receiving his degree in ceramic engineering at Ohio State in 1926, Beck has spent 22 years in the enameling industry. His experience includes laboratory work, plant layout, production supervision, engineering, and sales.

Home service workshops schedule

Home Service Workshops, sponsored by home service groups in regional gas associations in cooperation with the home service committee of the American Gas Association, have been arranged as follows: March 24, Southern Gas Association, Galveston, Texas; March 24-25, Pacific Coast Gas Association, Fair-



Now, Ferro engineers, with their new temperature recording instrument, can show you the inside picture of your continuous furnace operation. You can see at a glance if the temperature of the ware (at various levels) is correct; also the differences in temperature of light and heavy-gauge ware, of furnace loadings and burner adjustments.

Here is an opportunity to bring your continuous furnace up to peak operating efficiency . . . to realize new production economies. Let our engineers tell you more about this exceptional service . . . this newest contribution to better Porcelain enameling through Ferro. Write, today, for complete information.

FERRO
ENAMEL CORPORATION
4150 E. 56th St. · Cleveland 5, Ohio

mont Hotel, San Francisco; and April 20, New Jersey Gas Association, Newark.

The AGA Workshop held in Chicago in January drew an attendance of 250 persons from 32 states. Edwin L. Hall, director, AGA Testing Laboratories in Cleveland, discussed "Gas Fuel and Its Utilization" at one of the sessions held at the Congress Hotel.

Westinghouse to entertain Central District Enamelers

The April meeting of the Central District Enamelers Club is scheduled for Friday, April 9, at Westinghouse Electric Corporation (4th Street entrance), Mansfield, Ohio.

Westinghouse is entertaining with a dinner at 6:00 pm, to be followed by an address by C. L. Van Derau, works manager, and a tour of the modern Mansfield plant.

It is expected that this will be one of the most constructive meetings of the Club season, and all Club members and other interested enamelers are urged by the committee to attend.

Reservations must be in by April 6. Send to M. Bozsin, secretary, Central District Enamelers Club, 4150 E. 56th Street, Cleveland 5, Ohio.

Rare metals may be common

Tableware, jewelry and other products made of zirconium and titanium are envisioned by Dr. John W. Marden, metallurgist for Westinghouse Electric Corp. Strong but light, both rare metals take a high polish and won't tarnish. Dr. Marden estimates that their present high price, compared with other metals commonly used, could be cut by large-scale production.

ACS Pittsburgh section April meeting

Members of the Pittsburgh Section of the American Ceramic Society will hear an address on "Utilization of Solar Energy," by Dr. George Lof, technical director, Colorado Fuel and Iron Corp., at a Section meeting, April 13, at the Mellon Institute, Pittsburgh.

A much prized letter

Holding the most conspicuous location in the office of E. F. Voss, vice president of Voss Brothers Manufacturing Co., Davenport, Iowa, makers of household washers, is a letter written to him by Thomas A. Edison on January 19, 1927.

"As your concern and mine have been engaged for the last half-century in developing and exploiting devices for the lightening of burdens of other folks, it is a rather curious but pleasant coincidence that our Golden Jubilee should occur at about the same time," says the letter from the Sage of Menlo Park.

More news Page 68 →

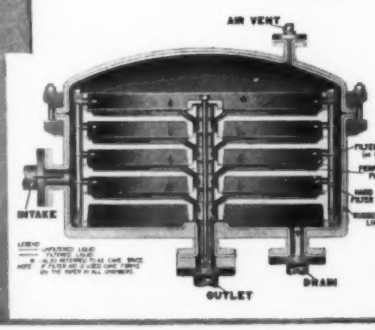
Filter All Plating Solutions Faster, More Completely in

SPARKLER
Horizontal Plate
FILTERS

Because the filter cake is held horizontally, it is absolutely stable to the end of each filtering cycle. And cycles are longer because the cake retains its porosity longer. That is why the "horizontal principle," as embodied in Sparkler filters, gives you more efficient, low cost, operation. Sparkler filters are pressure-tight and leak-proof, designed for intermittent or continuous operation.

4 Plating Solution Types
1. Rubber-lined for bright nickel
2. Stainless steel for acids
3. All Iron for alkaline solutions
4. All Steel (with Stainless Pump) for chromium

SPARKLER MANUFACTURING CO.
Mundelein, Illinois



Made in Capacities
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See your supplier or Write for details

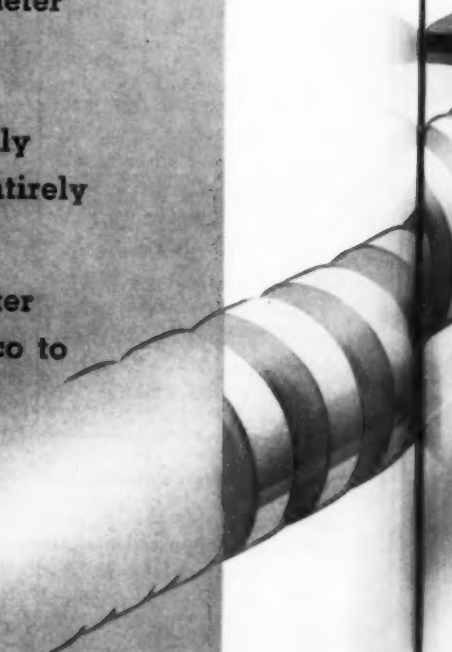
Our Engineering Service is available for any specialized problems.

The PEN wi

Beyond the range of the human eye! Yes, even beyond the power of the microscope this little pen records differences in color that make perfect matching an established fact at Pemco.

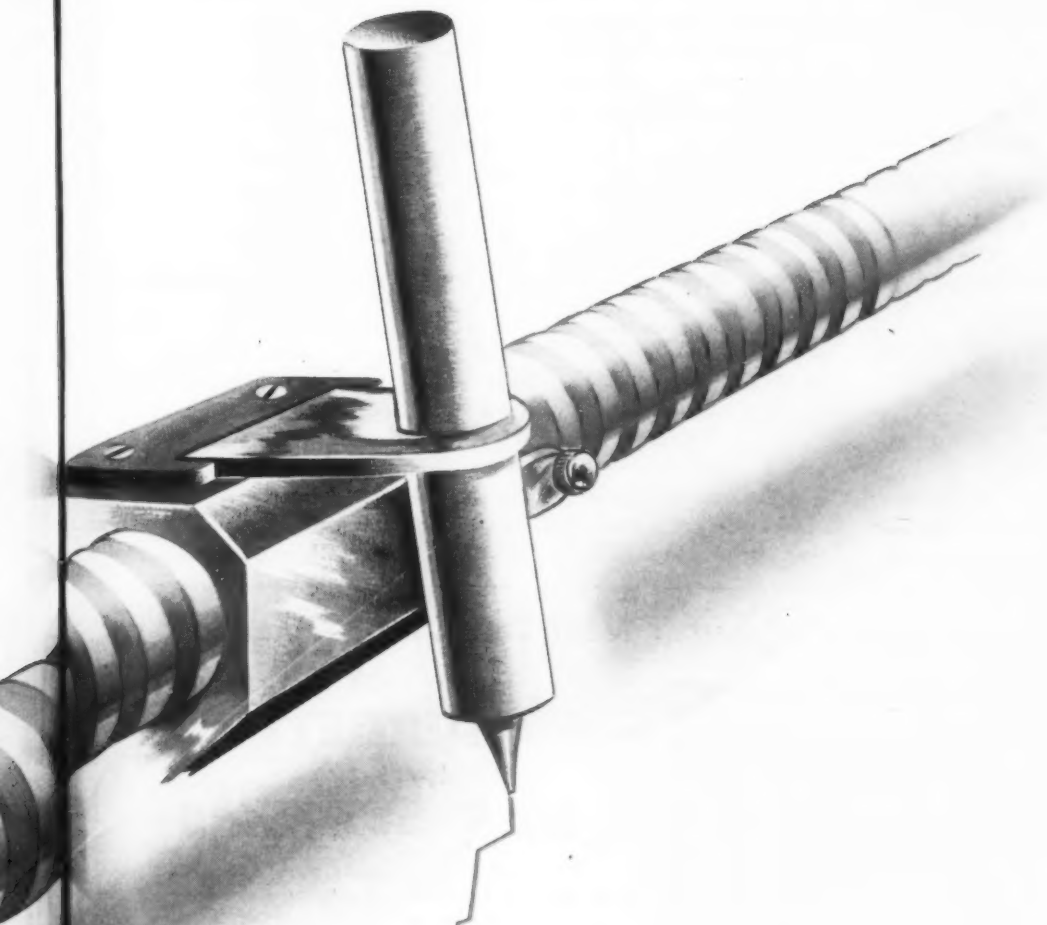
So sensitive it must be housed in an air conditioned room built on piers extending to bed rock, one of only four in the country, the electro-spectrophotometer at Pemco registers variation of color, too minute to be accurately detected by any other means. It analyzes color composition automatically and graphs its findings with this little pen, entirely independent of any human manipulation.

It is truly infallible! The electro-spectrophotometer illustrates the engineering care exercised at Pemco to produce materials of consistent high quality and uniformity* to the end that their use will guarantee low cost to the user!



*Continuous smelting . . . an exclusive PEMCO process . . . is the only sure method of producing ground or cover-coat—in commercial quantities—frits of positive uniformity. Pemco Continuous Smelters Patents Reg. in U. S. Pat. Office Nos. 2323930—2262029—2262070—2248877—2137931—2137930

it a brain . . .



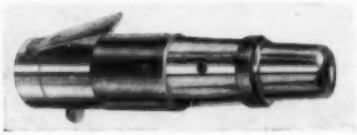
PEMCO CORPORATION

Baltimore 24, Maryland

Always Begin With a Good Finish

New Supplies and Equipment

Pneumatic hammer for top speed precision service



A new pneumatic hammer for precision work at top speed is the "Elgin Model 'G' Utility Hammer," which the manufacturer says will operate with minimum vibration.

It is 8" long and has bore and stroke of 7/8" x 5/8". It is stated that approximate speed on 100 lbs. pressure is 5,000 strokes per minute.

Further details may be had by writing Borm Manufacturing Co., Elgin, Ill.

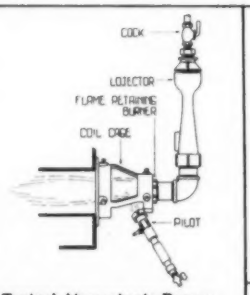
Carbide hand files

New hand files which feature "ground" teeth are now available with either 20 or 30 teeth per inch, and in either 3/4" or 1 1/4" widths.

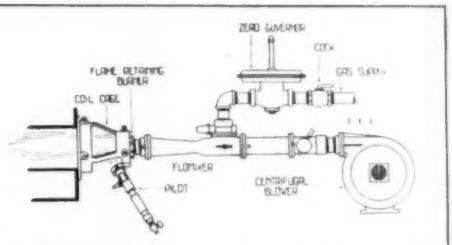
The manufacturer states that tests and initial applications indicate that the "ground" carbide files will cut steels no ordinary file will touch (up to Rockwell 62-C).

For further information, write Severance Tool Industries, Inc., 745 Iowa Street, Saginaw, Michigan.

Gas burner units for immersion heating



Typical Atmospheric Burner Immersion Coil Combination



Typical Open Blast Burner - Immersion Coil Combination

Newly-engineered immersion heating burner assemblies have just been announced. The assemblies involve spacer cages which are said to insure the entrainment of the required amounts of secondary combustion air in gas-firing immersed tubes for heating water, oils and other liquid solutions.

The atmospheric type "Coil Cage" burner comprises a gas cock, low pressure injector, flame-retaining burner nozzle, and coil cage with pilot. Usable with gases having Btu

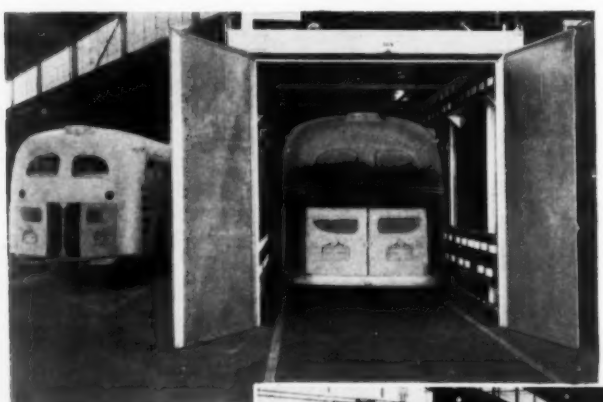
Mask Their Busses Immediately For Next Coat After Quickdry

with

BURDETT

(INFRA-RED)

GAS SYSTEMS



Interior of Burdett Infra-Red Oven—measuring 12' wide x 45' long x 12' high—shows General American bus with first finish coat of paint.

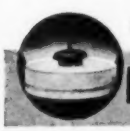
Just out of the Oven—General American Aerocoach has bright paint job dried quicker with Burdett Infra-Red System.

At the East Chicago, Indiana, plant of General American Aerocoach, two large **Burdett Infra-Red Gas Ovens** are used for paint drying of new busses. By using Burdett Systems, successive coats of paints are dried just as fast as the bus bodies can cool sufficiently to permit the placing of new paint masks.

There is no paint 'tackiness' . . . and no chance of a wet spot remaining. **Burdett Infra-Red** takes care of that. Lacquer dries in 15-20 minutes at 170°; enamel dries in 30-35 minutes at 180°.

For Burdett, these are unusually low temperatures and likewise slow drying BUT . . . it allows General American one unique feature. Their Busses can be painted fully equipped ready to drive away. There is no damage to glass, tires, engine or interior fittings.

Important! Write today for colorful all-new 12-page Illustrated Bulletin. See what the Burdett Infra-Red System can mean to you.



3401 West Madison St., Chicago 24, Ill.

BURDETT MANUFACTURING CO.
INFRA-RED GAS BURNERS

contents of from 450 to 3200 Btu, at pressures from 3″ W.C. to 12″, the atmospheric burners are rated from 27,500 to 350,000 Btu per hour.

The blast type "Coil Cage" assemblies permit higher capacities by utilizing combustion air under pressure. Using air at 4, 8, or 16 oz. pressure, the blast assemblies are said to deliver up to 1,400,000 Btu per hour.

Complete specifications of coil-cage equipment are contained in Bulletin 1C-1-F, available on request from Industrial Division, Bryant Heater Co., 1020 London Road, Cleveland 10, Ohio.

Industrial literature

Buffs — catalog page

A catalog page showing ten samples of cloth used for making buffs has just been issued. These sheets have the actual material glued on the page in such a manner that it can be readily examined. Beside each swatch is a brief description of the recommended use for that quality.

Ask for "Buff Cloth Bulletin — FDB-2" from Divine Brothers Co., 200 Seward Avenue, Utica 1, N. Y.

Book on "Traite' de Physico-chimie des Silicates"

Announcement has been made of the publication of the first of a series of three volumes on "Traité de Physico-chimie des Silicates" by Pierre Gilard, professor at the University of Liége. The second volume is in preparation and the third will follow rapidly.

The series is being published by Les Etudes des Composés Siliceux, 11, rue du Gentilhomme, Brussels, Belgium.

Brochure on adhesives sealers and coatings

Research help for industrial customers, in choosing the right adhesives, sealers and coatings, is offered in a new brochure.

Entitled "3M Adhesives in Industry," the 28-page brochure contains 40 pictures, cites 18 case histories, and lists a number of formulae offered by the adhesives and coating (Detroit) division of Minnesota Mining and Manufacturing Co.

Copies are available on request to the firm's offices at 901 Fauquier Avenue, St. Paul 6, Minn.

Reference data on buffing, polishing compositions

Fabricators and manufacturers in the metal working industry, interested in improving buffing and polishing operations, will find a new, 2-color, 20-page book filled with reference data on polishing, buffing and coloring compositions and their use.

There is a section on many types of quality buffs and polishing wheels. Each is illustrated and described and its application to a specific operation in the buffing room is given.

Write for Bulletin 48-1 to Department F, Speedie Division, The Buckeye Products Co., Cincinnati 16.

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BODIES, GLAZES, ENAMELS
GRANULAR OR MILLED
Orefraction
Rutile
HIGH TITANIUM OXIDE CONTENT
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PITTSBURGH, PA.
for use in:
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in carload or less-than-carload lots.
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When you specify "Orefraction," you are assured pure and clean Rutile. Exclusive preparation, separation and beneficiation methods—plus fine petrographic and chemical controls—make Orefraction Rutile uniformly high in quality.
Orefraction Rutile is used as a colorant in pottery bodies, glazes, enamels and porcelains. When used in porcelains and enamels, it promotes acid resistance in the finish.
OREFRACTION ZIRCON & ILMENITE
Send for working samples and complete information. Orefraction Ceramic Engineers are available for consultation without obligation. Write today.
Orefraction Inc.

How to choose the correct type of porcelain enamel for specific applications

(Continued from Page 26)

ommended that architectural enamels should be at least semi-acid-resistant.

Enamels for hot water tanks

Hot water under pressure, a condition encountered in domestic hot water storage tanks, exerts a strong solvent and destructive action upon the usual type of porcelain enamel used on domestic appliances or cooking utensils, even though the enamel be acid resisting.

However, special enamels, which have an extremely low degree of solubility, have been developed by hot water tank manufacturers and by frit manufacturing companies. They can be recommended as being highly satisfactory.

Commercial enameled tanks should comply with the standards adopted by manufacturers of porcelain enameled hot water storage tanks in cooperation with the U. S. National Bureau of Standards.[6]

Freedom from pinholes, blisters or thin spots in the coating is as important as using an enamel of low solubility characteristics.

Enamels for protection against high temperature corrosion

Regular ground coat enamel protects steel oven linings against rusting at operating temperatures up to 500° to 600° F.

Certain black cast iron enamels afford protection to cast iron grates above the burners on gas ranges, although the coating may eventually partially burn off.

Enamels maturing at around 1450° F. have been used to protect automobile exhaust manifolds against oxidation.

Enamels for exhaust manifold systems of gasoline motors operating at high temperatures, as developed at the U. S. National Bureau of Standards, have been described by Messrs. Harrison, Moore and Richmond in a recent journal,[7] and abstracts have appeared in trade magazines. The frits recommended in this report are available from commercial frit manufacturers.

Enamels for protection against wear and abrasion

The property of resistance to abrasion and scratching, as possessed by most acid-resisting enamels and the titania-bearing enamels has been mentioned. So also has the necessity of avoiding mill addition materials which cause excessive bubble structure in the enamel layer, but this presents no great problem, and is mentioned only as a reminder.

Actually, the very superior scratch and abrasion resistance of *all* porcelain enamel coatings, particularly compared to organic finishes, is well known and is a distinct advantage.

Porcelain enamel for industrial applications

Of industrial applications for porcelain enamel, there are many. These range from coatings on chemical processing tanks through a list which includes heat interchangers, space heaters, centrifugal pumps, meter casings, insecticide pumps, oil well pump cylinders, marine bearings, metal to glass seals, and many others where the physical properties of "glass" applied to metal can be used to advantage. Each of these uses often entail individual analysis of service conditions, and cannot be adequately discussed in a general paper of this type.

In case of doubt as to what type of porcelain enamel composition to use for any new or specific purpose, the services of various organizations are available in an advisory capacity to interested parties. The frit manufacturing companies and the Porcelain Enamel Institute are important sources of information and advice on porcelain enamel composition and uses.

(3) E. Skillicorn and J. E. Hansen, "An Alkali-Resistant Test for Porcelain Enamels," The Enamelist, pp. 16-20 (July, 1947).
(4) E. E. Bryant, "A Controlled Boiling Acid Test for Porcelain Enamels," Journal of The American Ceramic Society, p. 317, Vol. 20 (October, 1937). Also — U. S. Bureau of Standards Commercial Standard CS 100-44 (October 25, 1944).
(5) Wm. N. Harrison and Dwight G. Moore, "Weather Resistance of Porcelain Enameled Iron Structural Units," Journal of Research of the National Bureau of Standards, 28, June, 1942, RP 1476.
(6) National Bureau of Standards—Commercial Standard CS 115-44 (Feb. 29, 1944).
(7) Journal of Research, NBS, Vol. 38, (March, 1947).

Acknowledgment

The writer wishes to thank his associates, B. J. Sweo, E. E. Bryant and Dr. G. H. McIntyre of Ferro Enamel Corporation, Dr. George H. Spencer-Strong of Pemco Corporation, Dr. E. E. Marbaker of O. Hommel Company, and B. T. Sweely, Roger Fellows and E. E. Howe of Chicago Vitreous Enamel Product Company, for their helpful criticism and suggestions in preparation of this article.

Adapted for finish *from a paper presented before the Porcelain Enamel Institute Ninth Annual Forum.*

Fuel oils discussed at Pacific Coast enameling meeting

(Continued from Page 35)

method of removing the sulphur from the oils. Railroads, the steel industry, and other users, as well as enamelers, are interested in obtaining fuels with a low sulphur content. Sulphur content varies with the field producing the crude, and the crude coming from the new fields being developed is high. PS-100 has a sulphur content of 0.4%; PS-200 varies from 0.7% to 0.75%; and PS-300 and PS-400 have 1.5% plus. Since high sulphur content in furnace atmosphere causes enamels to scum, it is recommended that enamelers select fuels with as low a sulphur content as practicable, and that extra precautions be taken to insure "tight muffles" in all furnaces.

Equipment. Oil burning equipment is listed under two groups — (1) vaporizing type, and (2) atomizing. Heavy fuels may be atomized by steam, or by air of either low or high pressure. The conditions for burning oil are (1) by atomizing, (2) surrounded by air, (3) brought to ignition temperature, and (4) burned in suspension. It is vital for

MADE RIGHT to WORK RIGHT

MADE right to Work right — that's the story behind every bag of Century time-proved frit that is released for shipment to a customer.

Made right — because only tested raw materials are used, the plant equipment is of modern proved design and construction, and the men who control the production have had the years of experience required to produce consistently good enamels.

But that's not all — laboratory control of production and the finished product is constantly maintained and, most important of all, when you buy Century frit you know that every enamel, regardless of type, has been plant-tested in production enameling plants before it is offered for sale.

Be sure with Century in 1948. Send for a trial run now and check these statements in your plant.

FRIT from CENTURY

FRIT MASTERS

CENTURY VITREOUS ENAMEL COMPANY, 6641-61 S. Narragansett Ave., Chicago 38, Ill.

efficient operations that oil burning equipment be well designed, and always handled by personnel who thoroughly understand the particular equipment and can make necessary adjustments for its function.

A round table discussion of practical fuel problems followed Keating's address. Date and place of the next meeting was not set. Members will be notified, and non-members are urged to contact D. L. Bohon, club secretary, at The DeVilbiss Co., 1420 South Los Angeles St., Los Angeles 15. Phone RIchmond 2191.

Members of the Pacific Coast Enamelers Club will be interested in a report on Gil Close, who formerly represented *finish* editorially on the West Coast.

Gil is now in Chicago, and has taken a position with the advertising firm of Aubrey, Moore and Wallace, Inc. He asks that we express his appreciation for the hearty cooperation of West Coast enamelers in connection with his work for *finish*.

Industry news

→ *from Page 61*

John McKee to Tuttle & Kift as vice president

W. R. Tuttle, president of Tuttle & Kift, Inc., Chicago, announces the appointment of John McKee as vice president in charge of sales and advertising.

Formerly with Ferro Enamel Corporation, McKee goes to T&K with a broad knowledge and wide acquaintance in the appliance industry.

McKee, in his new post, will provide the necessary frequent and close executive contact with the range manufacturing customers of Tuttle & Kift.

Maypole Party

The Chicago District Enamelers Club Maypole Party will be an all-day session, Friday, May 21, at the Cherry Hill Golf & Country Club, 191st St. and S. Kedzie (near Flossmoor).

The Maypole Party committee announced that the festivities will begin about noon, with golf for those interested. Dinner and entertainment will be in the evening.

Members of the committee include G. W. Hofstetter, general chairman; G. N. Tuttle, chairman of golf committee; Ed. Bolin, chairman of tickets; F. W. Rozene, in charge of entertainment; and Rudyard Porter, in charge of publicity.

PREVENT IRON "FRECKLES" in your porcelain enamel finish

USE DINGS HIGH INTENSITY DE-IRONER FOR IRON-FREE SLIP

Only one pass through Dings De-Ironer . . . and iron particles are completely removed! Powerful magnetic coils provide 20 to 25% greater capacity. Long life grids. Two models in wide range of sizes — open gravity or closed pressure types. Gravity model contains float valve to keep De-Ironer at full capacity, with maximum separation at all times . . . Pressure model can be fed through top or bottom. Solenoid valve seals discharge opening when current is turned off. Easily installed either at discharge of gravity feed or directly in pipe line. Quick deliveries. Write for full details. DINGS MAGNETIC SEPARATOR COMPANY, 4750 W. McGeogh Ave., Milwaukee 14, Wis.

Electro and Alnico Magnets for Every Purpose

Dings "Since 1899"

"HIGH INTENSITY"

WANTED

Back Issues of FINISH

We need copies of the following back issues of FINISH, and will pay cash for available copies —

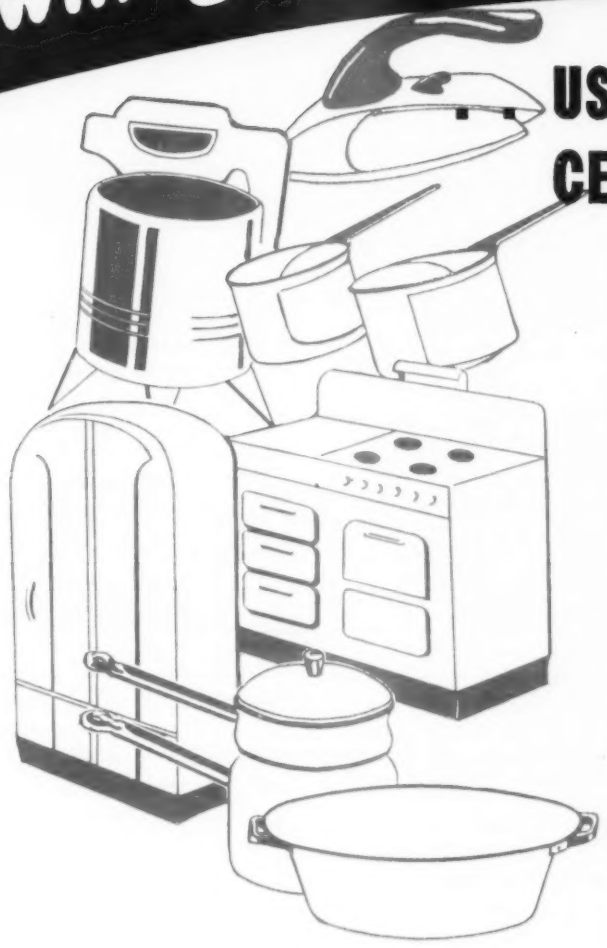
1944 — December
1945 — February and October
1946 — May, June and August
1947 — January and February

If you have copies of one or more of these issues please write to FINISH stating issues and number available.

DANA CHASE PUBLICATIONS
360 N. Michigan Ave. Chicago 1, Illinois

WHY 5000 CUSTOMERS...

USE OHCO CERAMIC PRODUCTS



Take a poll of OHCO *users*, and you'll find a score of different reasons for their choice of this house as their source of raw materials.

Boiled down to a few words, these 5,000 users prefer to deal with O. Hommel Company because:

Hommel keeps the USER'S point of view constantly uppermost . . . delivers porcelain-enamel frits, powdered clays, oxides, and supplies that result in the best finished product and minimize re-operation cost.

For 57 years, that has been the Hommel Creed — the CUSTOMER! Maybe you're missing something important if you have not yet enrolled on our USER list.

Why not get in touch with us and find out for sure? Five thousand users can't be wrong. (Among them are your competitors.)

Write, wire, or phone for a Hommel Service Engineer.

"We would like you to visit us in Space 2, Palmer House, at the American Ceramic Convention. April 25-30."

Laboratory Controlled Production of Ceramic Supplies

THE O. HOMMEL CO.
PITTSBURGH 30, PA.
Pacific Coast Agents
L. H. BUTCHER CO.

- FRIT for Steel, Cast Iron or Pottery
- CERAMIC COLORS
- CHEMICALS
- BRONZE POWDERS
- METAL POWDERS
- SUPPLIES
- EQUIPMENT

Our Technical Staff and Samples are available to you without obligation. Let us help you with your problems.

World's Most Complete Ceramic Supplier

Porcelain enameling in Italy

(Continued from Page 20)

structed and can easily be shifted around by lift trucks. For transporting the bisque ware to the furnace they use racks on large bicycle wheels.

The continuous dryers are arranged for putting in complete boards loaded with the ware coming from the dippers. One of these dryers has one line working in reverse direction so that first the inside of multicolored items can be enameled in white, sent through the dryer, taken off by the dipper who slushes the outside color, and then sent back in the same dryer for beading and firing.

For producing flat items and signs, an automatic spraying system, built in the plant and similar to the American machines, is being used.

The production of bath tubs utilizes special furnace

The enameling of the steel bath tubs represents one of the most interesting features of the plant, especially in view of the furnace constructed for this purpose.

The production comprises a variety of shapes and sizes: regular tubs in several sizes, square ones with and without apron, so-called "salon type" and others. The tubs are regularly pickled, then enameled in one ground and two cover coats.

A continuous chain connects spray booths and dryer and passes the location of the furnaces. This chain is not perpetually moving, but step by step. Any time the sprayers have finished a piece, they release the motor driving the chain so that the chain moves far enough to introduce the next bath tub into the spraying station. The tub can easily be turned around on the axle of the hook on which it is suspended. Three sprayers work simultaneously on the various sections and sides of the item.

While other European bath tub producers apply three white coats over ground coat, Bassano have the enamels and sprayers under good control, and have succeeded in getting a decent quality by coating white twice only over ground coat.

One of the most unusual features of the whole plant is the specially constructed furnace for firing these bath tubs. This furnace represents a round cylinder of 5′ diameter and about 8½′ depth, dug into the ground so that the removable cover of the furnace is on a level with the working floor.

The cover can be taken off by an electric lifting device, while a special crane with two electric hoists takes care of loading and unloading the ware. Two bath tubs are fired at the same time.

Thus, the furnace can be unloaded and reloaded within a short time, and automatic temperature and time controls help to maintain even firing conditions. The furnace, although originally designed for oil or gas as combustion source, is actually heated by electricity; but only the mantle is heated, neither the bottom nor the cover. From a fuel consumption standpoint, the whole construction seems to be based on a rather strange idea, as whenever the cover is lifted an enormous loss of heat occurs.

The cylindrical shape of the furnace was chosen since this construction seemed the easiest one, and they foresaw also the possibility of firing in this equipment smaller sized round tanks for industrial purposes.

In some of the bath tubs special holes are being drilled for hooking them on the supports. Later the holes are closed by inserting little enameled stoppers. The average firing time is 6 minutes.

Enamels and enamel preparation

The frit is produced in oil-fired rotary smelters, of about 1200 lbs. capacity, with an average smelting time of two hours. They also operate an electric rotary smelter with a capacity of 250 lbs.

The millroom is so well organized that one man only is required to take care of the entire enamel preparation. The mills are discharged by compressed air through transportable mechanical sieves, and the enamel pumped into tanks which are transported by lift trucks into the enameling department.

While steel is rolled in Italy, a certain part of the necessary chemicals has to be imported.

Almost all white enamels, including those for bath tubs, are opacified with "gas opacifier."

Only in special cases are solid mill opacifiers, sometimes in combination with the gas opacifier, employed. For tanks they produce an acid resistant grey, high in silica, with white specks.

The specks on kitchenware are made by mixing grains into the dipping enamels. For some stove parts a very nice marble is used, a combination of black and grey, which is very appealing.

The de-enameling is done by the molten caustic soda process, but this process appears to be economical only on very high-priced black shapes, especially bath tubs. The tanks are located behind large screens, and the baskets are operated by an electric hoist outside to protect the workers from dangerous splashing.

Other Italian plants

It has been reported that Ditta Giuseppe Moneta, in Milan, now owned by the third generation of the family Moneta, is just in course of modernizing its entire plant. Production at this company includes kitchen and hospital ware, stove parts, refrigerator parts, reflectors, signs, and miscellaneous products. Thirteen box type furnaces are equipped to operate with one of five fuels—coal, gas, oil, electricity or wood.

The third one of the leading large Italian enameling concerns is the "S. A. Smalterie Italiane", established about 40 years ago, operating two factories in Milan with production space of around 550,000 sq. ft. Originally they enameled the full assortment of holloware, but have now added to the production program a large variety of items of the enameled flatware field as well as of many other metalware goods. They have become in Italy the leaders in enameling apparatus for industrial and commercial purposes.

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FOR BETTER PORCELAIN ENAMELING

METALWASH EQUIPMENT FOR SPRAY PICKLING STEEL PRIOR TO PORCELAIN ENAMELING

METALWASH pickling machines wash, rinse, pickle, nickel coat, neutralize and dry all sizes of steel parts prior to porcelain enameling. This fully automatic continuously operating equipment produces a cleanly pickled nicely etched surface, evenly nickel coated, and completely neutralized and dried - entirely without manual handling.

The machine is a compact, enclosed unit equipped with an efficient venting system which prevents obnoxious vapors from escaping into the pickling room.

METALWASH automatic spray pickling machines, similar to that pictured above, are now in operation in many leading plants manufacturing ranges, refrigerators, washing machines, cabinets, cooking ware and other porcelain enameled products. Manufacturers report that these machines have increased production as much as 50 per cent, improved working conditions in the pickling room, and produced the finest quality porcelain enameled ware. Our engineering staff will be pleased to help you solve your pickling problems. Write for further information.

ENGINEERS AND MANUFACTURERS OF ALL TYPES OF METAL CLEANING, PICKLING AND DRYING EQUIPMENT

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